The Objective Force Battle Staff?

A Monograph
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ABSTRACT

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The Objective Force Unit of Action operates in a significantly different command environment. It is called “execution-centric command” and it relies on information superiority. The commander uses superior situational understanding and the “quality of firsts” to see first, understand first, and act first upon the enemy. The commander uses a “tactical infosphere” or networked information management system to gain and maintain information superiority. He uses sensor systems within his battlespace and is networked to joint and space-based intelligence assets. Additionally, the network allows the commander to leverage information from any information system or subject matter expert connected to the network. Within the tactical infosphere, he uses collaborative planning and automated decision aids. Lastly, the commander uses the tactical infosphere and experience to intuitively make decisions based on pattern recognition. In current doctrine, the battle staff completes the tasks of information management, staff decision-making, and providing the commander’s visualization. If the tactical infosphere provides the commander his visualization, manages information, and can assist in his decision-making, does the Unit of Action need a battle staff? This is the research question answered in this monograph.

The command environment is comprised of organizations, procedures, and technical means. This monograph uses the changes in the Objective Force Command environment and the battle staff tasks (information management, staff decision-making, and providing visualization) to answer the research question. It is answered by deciding if these three tasks are necessary in the Objective Force execution-centric command environment.

The Legacy Force Commander and battle staff use the analytical MDMP to create detailed plans and matrix’s. This is an attempt to eliminate uncertainty. The Legacy Force battle staff uses radio networks, in three command posts, and a hierarchical system of information management. The battle staff provides the commander’s visualization and situational understanding by collecting data and analyzing the data. The battle staff often suffers from “paralysis by analysis” and can increase the fog of war. The Objective Force commander uses the tactical infosphere to create a Common Operational Picture (COP) within his organization. This allows subordinates to exploit their combined situational understanding. This also allows the commander to use his digital decision aids to create and test adaptive mission-focused orders and plans. He is able to collaborate within and outside his organization and uses the rehearsal and playback software to build mental patterns for possible future decisions. Although it appears that the battle staff is obsolete, there is still a need for a battle staff to manage information and to help the commander execute judgment.

The new paradigm in command shifts the burden of command and control from a staff-centric model, to a commander-centric model. Organizations need to synchronize from lower echelons to higher and use mission-focused adaptive orders. The shift is from command by plan, to command by influence and the tasks for the battle staff are reduced. The battle staff could change to support the commander’s sensor and network requirements, or they can support the commander virtually via the network. The future battle staff needs to provide the tasks the technical means cannot. Their organization needs to enhance and not inhibit the tempo of warfare. Lastly, information systems cannot replace the battle staff or commander’s judgment.

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INTRODUCTION

The Objective Force Unit of Action uses "a significantly new approach to directing and managing operations."[1] The Objective Force draft concept calls it "execution-centric battle command." Future information technologies provide the commander nearly instantaneous situational understanding of friendly and enemy forces and his battlespace. Electronic sensors in his battlespace, joint reconnaissance assets, and spaced based intelligence assets gather current information. The revolutionary change is that the commander receives his situational understanding from an electronic display, in real time. The traditional method is to obtain it from the battle staff after they gather and analyze reports.

According to Army doctrine, battle staffs analyze "battlefield information" to assist/support the commander's situational awareness.[2] Situational understanding is the foundation for the commander's decision-making process. The staff gathers data, analyzes data into relevant information, and communicates it to the commander for decision-making. Throughout the process, the staff uses the analytical Military Decision Making Process (MDMP) to create estimates, solve problems, and create operations plans and orders.

TRADOC PAM 525-5 Force XXI Operations, states, "The ability to move information rapidly and to process it will likely change the way we command military operations. It will greatly influence force organization, command procedures, and staff systems."[3] Execution-centric command is a change to command procedures. Moreover, a networked information management

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[1]Headquarters TRADOC, *Draft TRADOC Pamphlet 525-3-91Unit of Action Concept* (Fort Monroe: Headquarters TRADOC, 2001), 14.
[2] U.S. Army, *FM 101-5 Staff Organization and Operations* (Washington D.C.,:Department of the Army, 1997), 1-3.
[3]Headquarters TRADOC, *TRADOC PAM 525-5 Force XXI Operations* (Fort Monroe: Headquarters TRADOC, 1999), 3-4.

system changes the technical means in which information is gathered, analyzed, and turned into situational awareness.

Martin Van Creveld believes the command environment is composed of organizations, procedures, and technical means. If Objective Force command procedures and technical means of information management change, the organization also changes. The purpose of this monograph is to determine if the Unit of Action Commander, acting in the Objective Force execution-centric battle command environment, needs a Legacy Force battle staff. The process used to answer the research is a comparison between organizations, procedures, and technical means of the Objective Force command environment and the command environment of the Legacy Force.

Chapter one analyzes the procedures, organization, and technical means the Legacy Force uses in the command environment. The Legacy Force command environment reference is *FM 100-5 Operations, 1993*. *FM 3-0 Operations* is the current operations doctrine and is "compatible" with Objective Force concepts.[4] The chapter concludes by determining battle staff's essential tasks: providing the commander's visualization, information management, and staff decision-making.

The purpose of Chapter two is to review the TRADOC Objective Force Concept to determine the new technical means, procedures, and organization used in the Objective Force command environment. The Objective Force Unit of Action concept defines the new command environment as execution-centric command. The networked information system is the technical means that allows information superiority. The procedures are collaborative planning, self-synchronizing forces, and intuitive decision-making. These changes determine if the new procedures and technical means of the Objective Force replace the essential tasks performed by the Legacy Force battle staff.

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[4] Headquarters TRADOC. *Unit of Employment Concept* (Fort Monroe: Headquarters TRADOC, 2001), 4. "The concepts ideas and constructs described in this paper are compatible with the existing body of Army

Chapter three compares the changes in procedures, technology, and organizations of the Objective Force to the essential tasks of the Legacy Force battle staff. If the networked information system and execution-centric command procedures can manage information, make staff decisions, and provide the commander's visualization, then the Legacy Force battle staff organization is not necessary.

Chapter four provides conclusions and recommendations. The initial insights from the Army Warfighting Experiments validate the need for a change to the battle staff. The recommendations from the Digital Control Exercise (DCX) II provide recent evidence to confirm the need for a new organization in the Objective Force. The recommendation section offers three new concepts for new staff organization: the virtual staff, battlefield information staff, and the networked army staff.

This monograph uses several assumptions. First, the predicted technology enhancements used by the Objective Force are valid and available. Additionally, the draft Objective Force concept is the best current resource available for predicting the future battle command environment.

This monograph examines battle staff operations at the Unit of Action or Legacy Force battalion level or brigade equivalent level. Its focus is on the essential tasks the battle staff provides the commander during a combat operation. It does not address the actions they provide the commander in garrison.

LEGACY FORCE COMMAND EVIRONMENT

LEGACY FORCE DOCTRINE

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doctrine including FM 1, FM 3-0."

The battle command environment of the 1990's is a reflection of a revised operations doctrine, command experiences of Desert Storm, and the recognition that new technology changes battle command. Martin Van Creveld states the functions of command are timeless, but the means of applying them have evolved and will continue to change. He classifies these means into three categories: organizations, procedures, and technical means. He further states that the combination of these three "make it possible to describe the structure of any command system at any given time and place."[5] The organization used to exercise command is the battle staff. Operations and staff doctrine determine the procedures used at the tactical level. Lastly, technical means is the way the Army executes command within the Army Command and Control (C2) System.

The Legacy Force command environment doctrine is in the manual, *FM100-5 Operations* issued in 1993. *FM100-5* uses the new term "battle command" to describe the command environment or procedures. The commander provides mission type orders and commanders intent to exercise battle command. This new term and focus on mission command is a result of the Army's experience with new technology and its first information dominant war.

The lessons from Operation Desert Storm compelled TRADOC to revise the Army's operations doctrine. *TRADOC PAM 525-5,Force XXI*, cites two reasons to revise doctrine: lessons from previous operations and emergence of new war fighting technologies.[6] The military technology build-up of the 1980s introduced laser guided munitions, ship launched cruise missiles, and night vision devices, which changed modern warfare. Commanders at the tactical level experienced how new technologies increased their access to near real time battlefield information. GPS provided precise location of units and satellites and J-STARS[7] provided a

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[5] Creveld, Martin, *Command in War* (Cambridge: Harvard University Press, 1985), 10.
[6]Headquarters TRADOC, *TRADOC PAM 525-5*, 3-4.
[7] Headquarters Department of Defense, *Department of Defence Joint Dictionary of Military and Associated Terms* (Washington D.C.: Headquarters D.O.D., 2001), A-35. JSTARS, Joint Surveillance Target and Reconnaissance System.

clearer picture of the enemy and the terrain. Commanders received "glimpses" of some powerful new capabilities."[8]

The Training and Doctrine Command (TRADOC) and Combined Arms Command (CAC) commanders both realized the Army could couple efficiency and innovation. They understood that the expansion of information technology on the battlefield changed command. Their guidance to the authors of *FM 100-5* was to ensure they examine impact of information technologies, the outcomes of the Army Warfighting Experiments (AWE), and *TRADOC PAM 525-5 "Force XXI."*[9] They understood that new capabilities changed the command environment and doctrine needed revision.

LEGACY FORCE PROCEDURES

This chapter's purpose is to define what procedures the commander and battle staff uses in the Legacy Force[10] battle command environment. The first section of this chapter, demonstrates how the battle staff gathers and analyzes information and uses it to help the commander visualize his battlespace. Next, the commander and staff use an analytic decision-making process to plan and solve problems. The commander utilizes the battle staff to manage information, make staff decisions, and provide situational understanding. The Legacy Force commander commands by a combination of centralized and decentralized control and uses detailed orders to communicate his visualization to subordinates. Commander's intent helps subordinates make decisions when they cannot communicate with the commander, or when their tactical situation changes from the plan.

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[8]Blackwell, Paul E. and Bozek, Gregory E., "Leadership For the New Millenium," *Military Review* Vol. 78 Issue 3 (May/Jun 98): 40.

[9]The purpose of TRADOC PAM 525-5 is to provide insights into the future operational concept of the Force XXI or future digital division. HQ TRADOC, *Force XXI*, 3.

[10]"The Legacy Force is the strategic hedge that provides this essential capability in support of the National Command Authorities and warfighting CINCs. Inherent in this requirement is for the Army to modernize, sustain and recapitalize the Legacy Force to guarantee maintenance of critical warfighting readiness." U.S. Army, *Army Transformation Campaign Plan* (Washington D.C.: Department of the Army, 2001), 5.

Two new terms appeared in the revised doctrine that indicates a shift in procedures from systems to a commander-centric approach. The term "battle command" first appears in the 1993 version of FM 100-5 replacing the old term of "command and control" (C2) as a combat function.[11] Although it appears TRADOC is repackaging old ideas with new terms, it is apparent that there was need to distinguish the difference between the art of visualizing and decision-making, and the system used to implement command.[12] The change is a shift from a systems-focus of command, which optimizes various systems, to a commander-focused model stressing skills and abilities.[13]

The first paragraph of the section on battle command in *FM 100-5* warns future commanders of the necessity to manage thousands of bits of information to visualize the battlefield.[14] *FM 101-5* introduces new terms that deal with the commander's information management. Included in the six elements of battle command are information assimilation, visualization, and conceptualization. These new terms relate to the amount of information the commander receives, how he comprehends it, and how he uses it to form a mental picture of the current situation and end state. This section emphasizes that the days of waiting for "detailed direction" from higher headquarters and providing staffs and subordinates with detailed guidance is over. This type of command is mission style command.

The concept of mission orders is not new. It receives emphasis in *FM 100-5* because future operations will take place over larger distances and with increased tempo. These two factors highlight the importance of subordinates acting quickly without orders from commanders. Mission command is telling subordinates what to accomplish and leaving the method of "how" to

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[11]Combat functions help a commander build and sustain combat power. At the tactical level they are called Battlefield Operating Systems (BOS) and include Intelligence, Maneuver, Fire Support, Air Defense, Mobility and Survivability, Logistics, and Command and Control. U.S.Army, *FM 100-5 Operations* (Washington D.C.: Department of the Army 1997), 2-12.
[12]TRADOC Battle Command Battle Lab, *Battle Command Draft 2.1* (Fort Leavenworth: BCBL 1994), 3.
[13]Bradford, Jeffrey A., "McArthur, Inchon, and the Art of Battle Command," *Military Review* Vol 81 Issue 2 (Mar/Apr 2001): 1.
[14]U.S. Army, *FM 100- 5*, 2-14.

accomplish it to the subordinate. The purpose of mission orders is to allow the "greatest operational and tactical freedom for subordinate leaders."[15]

The 1993 revision of FM 100-5 includes the procedure of commander's intent to facilitate mission command. Commander's intent describes the desired end state and is a concise expression of the purpose of the operation. The purpose of commander's intent is to allow subordinates to continue towards the commanders end state, even when the initial concept of the operation no longer applies. It emphasizes the necessity for the commander to command in the face of leaders and not from a computer screen. The new doctrine addresses the complexities of increased information and the command environment, but no organizational changes to the battle staff.

Thomas Czerzinski believes Army command and control is at a crossroads. He states that commanders execute command by direction, by plan, by influence, or by a combination of the three.[16] His argument is that the Army is trying to shift the function of command from detailed plan, to influence. Command by plan, is commanding by a detailed script and is characterized by the Army's emphasis on detailed planning with decentralized execution.[17] Today, a Division order is longer than the orders for the invasion of Africa in World War II.[18] The staff prepares a detailed matrix of events and uses commander's intent to guide subordinates when the matrix fails to cover all contingencies or when there is an absence of guidance.[19] Although the Army's operations doctrine defines the command process as mission command

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[15]Ibid, 6-5.
[16] Czerzinski, Thomas, "Commmand and Control at the Crossroads," *Parameters*, (Autumn 1996): 121. See also, McClure, William B. *Technology and Command Implications for Military Operations in the Twenty First Century* (Maxwell Air Force Base: Air University Press, 2000), 1-2.
[17]U.S. Army, FM 101-5, H-4.
[18]The outline plan for Operation Torch was four pages. 1st Armor Divisions base order for Desert Storm is 12 pages. See CJCAC, Outline Plan Operation Torch, 1941 and Seventh Corps AAR Operation Desert Storm, 1st Armored Division, annex F. Fort Leavenworth, Combined Arms Resource Library archives. Accessed 12 Jan 02.
[19]Headquarters TRADOC. *TRADOC PAM 525-100-2 Leadership and Command on the Battlefield*. (Fort Monroe: Headquarters TRADOC 1993) 6. "They wanted to develop an intent that would allow subordinates to make the right decisions in the absence of orders."

using mission orders, Czerzinski's observation shows that the Army is using a combination of command by plan and command by influence.[20]

The draft *FM 6.0 Command and Control* uses the terms mission command and detailed command to define the current Army command and control methods. Detailed command or command by plan, attempts to eliminate all uncertainty in war through the use of detailed plans and orders that are explicitly followed by subordinates. It emphasizes the importance of vertical information flow from lower to higher headquarters. There are limitations to both methods, and commanders use a combination of the two. "The degree to which he incorporates some detailed command techniques depends on a variety of factors, such as the nature of the action or task, the qualities of his staff and subordinate commanders, and the nature and capabilities of the enemy."[21]

The first sentence in *FM101-5* states, "staffs exist to help the commander make and implement decisions."[22] The most critical is how the commander translates his perception of his current disposition and the actions that are required to get to the end state. The commander uses a procedure to help him visualize, plan, and direct these actions. The Legacy Force commander uses the Military Decision Making Process (MDMP). It is a "single, established and proven analytical process" used in problem solving, developing estimates, and planning.[23]

The MDMP is the Army's analytical approach to problem solving. When completed in its entirety, it is a 36 step deliberate process. It helps the battle staff define a problem, suggest possible solutions, test the solutions, and give the commander an optimized solution. The process is abbreviated, or less optimized, based on time constraints. The analytic methodology is to "seek

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[20]"Characteristics of good operations orders include balance between centralization and decentralization" CGSC, *ST 100-3* (Ft Leavenworth: CGSC, 1998) [Internet]; available at http://www.cgsc.army.mil/nrs/publications/STs/ST100-3_98/start_here_ST100-3.htm, 1-12.
[21]"Characteristics of good operations orders include balance between centralization and decentralization" U.S. Army, *FM 6.0 Command and Control* (DRAG Edition) (Washington D.C: Department of the Army 2001), 1-14.
[22]U.S. Army, *FM 101-5*, 1-1.
[23]U.S. Army, *FM 101-5*, 5-1.

knowledge in complex environments" reducing the problem into a series of smaller problems and decisions. Critics of the MDMP agree that it is time consuming and overly analytical. When used in its intended method, does not allow the commander to use his intuition.[24] The MDMP is the analytic decision-making procedure the battle staff uses to help the commander make an optimized decision, and allow the battle staff to produce plans and orders.

The Army planning process using the analytical MDMP is time consuming. The doctrine recognizes this and uses the one-third/two-thirds rule and parallel planning to help alleviate some of the delays. Organizations conduct parallel planning between higher and lower headquarters to reduce planning time. The higher headquarters provides information through Warning Orders[25] and uses liaisons to eavesdrop and gain information. *FM 101-5* states that it is a risky process, it may actually waste time. It is most effective during the mission analysis phase of planning, and not used to simultaneously develop courses of action. Many factors limit the detail of planning, but the greatest limit is time. Parallel planning and time rules for staffs exist in the planning doctrine, because time is the most significant limiting factor in the level of detail and the number of steps used in the MDMP.[26] Although time is a limiting factor in the number of steps and processes used in planning and making decisions, in the Legacy Force command environment, it has not constrained the conduct of war.[27]

LEGACY FORCE ORGANIZATION

The term battle staff is the personnel that the commander uses to exercise battle command. It includes the commander himself, the principal staff personnel, and any key

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[24]Paparone, Christopher R. "U.S. Army Decisionmaking: Past, Present and Future," *Military Review* Vol. 81 Issue 4 (Jul/Aug 01): 45. Intuition is an unconscious appreciation of patterns of operations and fosters the ability to find workable solutions faster and when there is missing information. See Klein, Gary. *Sources of Power*. (Cambridge: The MIT Press, 1999) 33.

[25] U.S Army, FM 101-5, H-3. Warning orders are "a preliminary notice of an order or action that is to follow." They provide "essential details of the impending operation, and detail major time-line events."

[26]U.S. Army, *FM 101-5*, 5-5.

[27]McClure, William B., "Technology and Command: Implications for Military Operation in the Twenty-First Century," 2.

personnel he includes. The battle staff is the organization the commander uses to plan, direct, coordinate, and control military operations. It is part of the C2 system.[28] The battle staff is the organization the commander uses to execute battle command.

The brigade and battalion battle staff is functionally organized based on the French and Prussian models used by General Washington in the Revolutionary War. As laid out in 1781, they still exist today in the functions of personnel, intelligence, operations, and supply. The theory that "all duties of a command can be divided into four principal functions"[29] is where Hittle believes this organizational model originated. Even though the Army has gone through many modernization programs, it has not changed the staff model or doctrine to keep pace.[30] The trend that has followed is opposite to the goal of modernization. As the Army has transformed and modernized to increase command and control efficiency, the size and structure of the Army tactical staffs has increased and become more complicated. The Army command post system is illustrative of this point.

LEGACY FORCE TECHNICAL MEANS

The Legacy Force uses a linear system of information management and command posts (CP) as its technical means in the command environment.[31] From forward to rear they are the Tactical Command Post (TAC), Main CP, and Rear CP. The TAC CP is small and mobile, while the Main and Rear CPs are larger and cannot displace with organic vehicles. The commander, operations officer, fires support coordinator (FSCOORD), and other staff members operate forward in the TAC, and control one element of the battle, the close fight. The Main CP is the

[28]U.S. Army, *FM 101-5*, 1-2.
[29]Hittle, James D., *The Military Staff, Its History and Development* (Harrisburg: Stackpole Co, 1975), 179.
[30]Taylor, Clarence. "U.S. Army Staffs Are They Broken?" (Monograph, School of Advanced Military Studies, 1992). This monograph examines the staff doctrine, development, and why the staff has not changed with the modernization of the Army in the 20th century.
[31]U.S. Army, *FM 101-5*, I-1. The staff doctrine, FM 101-5, defines information management as a "system" in Annex I, therefore it is not considered a technical means.

"control, communications, and coordination center for combat operations."[32] It contains the intelligence section and the operations section, which includes field artillery, engineer, and air defense staff officers. The rear CP sustains the battle and includes the personnel and supply functions of the battle staff. *FM 71-3 the Armored and Mechanized Infantry Brigade* states, "The brigade staff is functionally organized to help plan and conduct deep, close, and rear operations."[33] This is an echeloned or linear organization based on linear fighting and reporting.

The battle staff, at brigade organizations and below, shares information and sends reports on a hierarchical basis.[34] Decision and situational awareness information are sent from higher to lower headquarters. The vertical structure does not prohibit horizontal information flow between units or staffs. The organization shares information horizontally by the informal system of "eavesdropping" and "cross talk"[35] on communication "networks." The networks share information functionally, like the staff orientation. Networks form for command and control information, intelligence and operations, fire support, and administration (personnel) and logistics information. The most vital information the commander needs to make decisions and get situational understanding is limited to one network. In order for the organization to truly share information throughout the organization, a battle staff officer has to listen to all the voice messages on three networks to get a common understanding of the operation. *FM 71-3*, recommends the TAC monitor eight networks for situational understanding. This is possibly, why the modernization of the Army has increased the demand for larger staff organizations.

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[32]U.S. Army, *FM 71-3*, 3-12.
[33] Ibid, 3-14
[34] A Rand Corporation study on information and military command and control supports these observations. The study emphasizes that the hierarchical command and staff structures are designed for control, not command, and flow up and down. They describe the command system as one in which reports flow up, staffs interpret them, and this is how the commander gets situational awareness. The commander then reacts to the situation rather than anticipating events. Builder, Carl H., Bankes, Steven C., Nordin, Richard. *Command Concepts A Theory Derived from the Practice of Command and Control* (RAND, 1999) [Internet]; available at http://www.rand.org/publications/MR/MR775/.
[35] Eavesdropping is informal technique where commander's listen to other commanders radio conversations "to obtain real time information." Crosstalk is the informal process of lateral communications between subordinates and "fills in the hole and vagueness of orders and guidance." TRADOC, *525-100-1*, 27-30.

FM 101-5 states the battle staff has three methods of communicating information: written, verbal, or through graphic displays (maps or charts). Headquarters vertically share information through "reporting systems." The purpose of the reporting system is to ensure reports provide the information that is "important" to that organization. Reporting systems use a reporting matrix. Battle staffs use the matrix to send the right information to the next higher headquarters and section, at the right time. Staff doctrine recognizes that the reporting system is time consuming and often time is wasted sending unanalyzed or irrelevant information in reports.[36]

Lastly, the technology that the Legacy Force uses to execute battle command, manage information, and help with visualization is in transformation. The system is in transition from voice radio communications to computer information systems. Tactical Internet and Mobile Subscriber Equipment (MSE) allow the battle staff to electronically transmit information. These electronic enablers allow staffs to share information in the same formats and at much greater speed. *FM 101-5* specifies that staffs share information along specific "channels". This is to ensure that information gets to the right person in a timely fashion. Unfortunately, this channelized system of vertical information flow does not facilitate information sharing. This is why commanders and battle staffs use the informal system of "eavesdropping" and "cross talking" to share information.

The transformation from a hierarchical to sharing, information management concept was the introduction of "system of systems"[37] in 1994 and the Army "digitization"[38] program. The Force XXI Battlefield Digitization program's "intent is to integrate digital communications and

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[36] U.S. Army, FM 101-5, I-4. "Limit reporting to essential information reduces the amount of time a subordinate must spend on collecting, analyzing, formatting, and transmitting reports."

[37] System of systems "a vast and complex web of computers, radios, and routers intended to provide the means for improved command and control on future battlefields." Office of the Secretary of Defense, *Battlefield Digitization*: (Washington D.C., Office of the Secretary of Defense Department of Testing and Evaluation Report, 2000) [Internet]; Available at http://www.dote.osd.mil/reports/FY00/pdf/00digitization.pdf, III-21.

[38] Digitization "fully modernized units possessing digital command and control systems", U.S. Army, *FM 71-3*, B-1.

information management technologies across the combined arms spectrum."[39] The Army's goal for digitization is to share information in a network. It is testing and fielding networked systems in the 4th Infantry Division at Fort Hood, the Army's first Force XXI division. The Army Battle Command System (ABCS)[40] is the information management system in use in 4th Infantry Division.

The Army reduced the 4th Infantry Division's maneuver forces by 25% based on the efficiencies gained through digitization.[41] *FM 71-3,* has an appendix on the impact of digitization on the combined arms brigade. It addresses the ABCS, the mobile command post Command and Control Vehicle (C2V), and which staff officers work in these new systems. It does not offer insights into reorganizing the battle staff. Digitization should reduce the battle staff by 25%, however the battle staff increased in size.[42]

BATTLE STAFF ESSENTIAL TASKS

Battle command consists of two components, leadership and decision-making. Since leadership pertains to the commander's personal responsibility to his unit, the battle staff supports the commander's decision-making. The three essential tasks that the battle staff completes are providing commander's visualization, staff decision-making, and information management.

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[39]Ibid.

[40] The Army Battle Command System (ABCS) consists of eight information management systems that are functional by B.O.S., but networked to each other horizontally and vertically. The following is a list of the systems and the B.O.S. they belong to: Maneuver Control System (MCS) for maneuver, All Source Analysis System (ASAS) for Intelligence, Advanced Field Artillery Tactical Data System (AFATDS) for artillery, Combat Service Support Control System (CSSCS) for logistics, and Forward Area Air Defense Command Control and Communications (FAAD C3I) for Air Defense. The networking of the systems is done with SINGARS communications system, EPLRS, and Force XXI Battle Command Brigade and Below (FBCB2). FBCB2 is the networked integration of all B.O.S. systems on one display. FBCB2 provides mounted and dismounted tactical combat, combat support, and combat service support leaders and soldiers integrated, on the move, real time and near real time battle command information and situational awareness. OSD, *Battlefield Digitization*, III-22.

[41] Ibid, III-21.

[42]The Force XXI Brigade Headquarters has increased in personnel from 84 to 107. USAFSARDD, TOE HHC Infantry Division (Mech) BDE and Infantry (MECH) BDE (XXI) (Washington D.C., USAFSARDD) [Internet]; available at http://www.usafmsardd.army.mil.

These three essential tasks directly support the goal of battle command which is, "recognizing and anticipating battlefield activities in order to decide and act faster than the enemy."[43]

"Staffs exist to help the commander make and implement decisions."[44] If staffs exist to help the commander make decisions, then an essential battle staff task is one that is required in the decision-making process. *FM 101-5* lists 16 staff activities that assist the commander. [45] Figure 1, is a synthesis of staff tasks that are essential to the commander to make decisions, or to execute battle command. Each staff activity is show in relationship to three essential tasks: information management, staff decisions, and providing visualization information.[46] The process illustrates the relationship of the tasks and the staff's continual requirement to take data and make it useful information for the commander's use in decision-making.

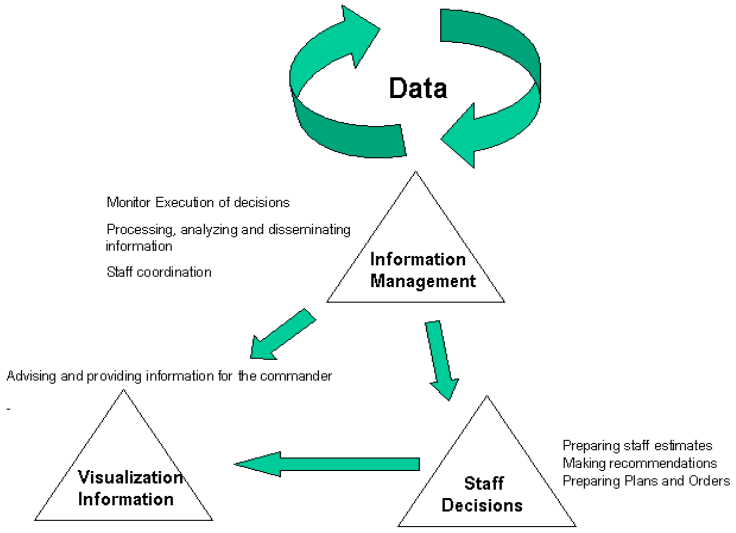

Figure 1

[43] U.S. Army, *FM101-5*, 1-3
[44] Ibid, 1-1.
[45] Ibid, 5-5. The 16 tasks are providing information, staff estimates, make recommendations, prepare plans and orders, monitor execution of decisions, process information, analyze problems, staff coordination, training, staff assistance visits, risk management staff inspections, writing, research, administrative procedures, supervisor personnel.
[46] *FM 71-3* supports the three essential tasks of the battle staff. It outlines the tasks the staff provides for the commander as providing and disseminating information, making estimate and recommendations (decisions). U.S. Army, *FM 71-3*, 7-1.

Battlefield visualization is the process whereby the commander develops a clear understanding of his current state with relation to the enemy and environment. He envisions a desired end state, and then visualizes the sequence of activities that move his force from its current state to the end state.[47] Battlefield visualization is new in Army doctrine. It first appears first in the 1993 version of *FM 100-5* and is one of the six primary elements of battle command. *FM 101-5* states that the staff assists the commander in the visualization of his battle space by collecting, processing, analyzing, and transforming data to knowledge. The battle staff's goal is to provide the commander, either verbally, graphically, or written, the knowledge he needs to form a mental picture of his forces in the present and future in terms of time and space. The commander articulates his visualization to the battle staff. The battle staff uses it to prepare estimates, orders, and informational products.

Managing information, the second essential task that the staff provides the commander, is rooted in the task of visualization and decision-making. *FM 101-5* states, "Proper information management ensures that the commander receives the information he needs to make timely key decisions".[48] The battle staff's goal is to process the large amount of data and turn it into information that provides the commander with knowledge. The commander uses this knowledge in decision-making.[49] The goal of the information management process is to provide the commander with situational awareness.[50]

The battle staff manages three types of information: situational understanding information, execution information, and Commander's Critical Information Requirements (CCIR). Additionally, the battle staff coordinates the vertical flow of information to

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[47]Ibid, 1-3.
[48]U.S. Army, *FM 101-5*, I-1.
[49]U.S. Army. *FM 100-6 Information Operations* (Washington D.C., Headquarter D.A., 1996), 1-11.
[50]Ibid, 1-11. Situational awareness is a common understanding of the commander's assessment, his intent, concept of the operation, friendly and enemy dispositions, and capabilities.

headquarters. The method the battle staff uses to receive and transmit information is hierarchical.[51] "Today's military services have progressed from the telegraph to modern age microburst transmitters, but still operate under the same centralized control and hierarchical organizational orientation employed by Frederick the Great and Napoleon."[52] These three types of information provide the commander and his units with situational awareness.

Imperfect information flow and incomplete situational awareness, or the "fog of war," is a situation the battle staff and commander deal with regularly. The commander has two methods to deal with this, CCIR and assumptions. Assumptions are suppositions about the current and future situation, and "fill in the gaps in what the commander and staff know about a situation."[53] Assumptions are necessary when the commander or battle staff have imperfect situational awareness.

Lastly, throughout the process of providing the commander his visualization and managing information, the battle staff is making decisions. The battle staff makes decisions during the MDMP staff estimate process and orders process. The battle staff makes decisions in order to solve the larger problem, providing the commander an optimal solution to the tactical problem without overwhelming him with useless data. The battle staff continually makes decisions on what information they receive will or will not support a commander's decisions. They receive data, analyze and process it, and turn it into information. They have to make a decision on whether this information is relevant to the CCIR, execution, or situational understanding.[54] This type of process is distributive decision-making.[55] Distributive decision-making is a staff-centric decision-making process.

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[51]U.S. Army, *FM 101-5*, I-11. States that the Army reporting system is based on information relevant to both higher and lower headquarters.
[52]Roman, Gregory A., *The Command or Control Dilemma: When Technology and Organizational Orientation Collide* (Maxwell Air Force Base: Air University Press, 1997), 7.
[53] U.S. Army, *FM 101-5*, 5-7.
[54] U.S. Army, *FM 100-6*, 1-11.
[55] "describes the cognitive processes that mediate effective coordination within a group of decision makers." This theory is used when an organization uses the centralized planning decentralized execution

The battle staff filters unnecessary information and it is the commander's critical information management system. They decide the amount, utility, accuracy, clarity, brevity, coherence, objectivity and verifiability of the information they use, and provide to the commander.[56] Battle staffs use the commander's visualization to make decisions on what information is valuable or is irrelevant. The individual functional representatives (personnel, operations, intelligence, and logistics) of the battle staff are what Peter Drucker terms "Knowledge Worker". Knowledge workers are the key personnel that executives use to convert data to knowledge and manage information necessary for action.[57]

The purpose of this chapter was to illustrate the command environment and methods of the Legacy Force brigades and battalions. The commander uses the procedures of detailed plans, mission orders, and commander's intent. The battle staff is the organization that manages information for decision-making. They accomplish this by making staff decisions and managing information that provides the commander's visualization of the battlespace. Lastly, the technical means is the Command Post system, eavesdropping, and cross talking to share information in a hierarchically structured reporting system. The Digitization of units is going to change the way commanders execute battle command. Does the Objective Force commander need a battle staff that manages information, makes decisions, and provides his visualization? Or is it obsolete?

OBJECTIVE FORCE COMMAND ENVIRONMENT

OBJECTIVE FORCE DOCTRINE

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doctrine. It is when a group of individuals individually make decisions in their specific area of expertise to advance the objective of the group. "Distributed decision making also characterizes military organizations." *Presentations for Distributed Decision Making.* Edited by Stuart E. Johnson and Alexander Levis. *Science of Command and Control* (Washingto D.C.: AFCEA International Press, 1988), 129.

[56]U.S. Army, *FM 101*-5, I-3.

[57] Drucker, Peter F., *Management Challenges for the 21st Century*: (New York: HarperCollins, 1999), 124. A Knowledge Worker is someone who knows more about his or her job than anyone in the organization. Drucker's assertions about information management at the corporate executive level, relate directly to the battle staff as information managers.

The Chief of Staff of the Army's *Objective Force White Paper* provides the broad concept of the Objective Force. The Objective Force pamphlets and white papers are not doctrine, but "conceptual foundations" for experimentation and they "reach beyond it to describe new ways and means of conducting military operations."[58] The Army published *FM 3.0 Operations* in June of 2001. It is the Army's doctrine for operations and it is compatible with the Objective Force Concepts from TRADOC. The purpose of this chapter is to define the differences in the command environment from the Legacy Force to the Objective Force.

The Objective Force is the future Army organization based on the concepts in *Joint Vision 2010*. The Objective Force is the end state force in the Army Transformation Program. The goal of the Army Transformation Program is to ensure that the Army can meet "the Nation's requirements today and in the future."[59] The Army Transformation Campaign Plan transitions today's Legacy Force to Interim Forces, or Interim Brigade Combat Team (IBCT) for full spectrum contingencies, and ultimately to the Objective Force.

The goal of the Objective Force is to be the premiere joint land combat force that is strategically responsive, and dominant across the spectrum of conflict. The Objective Force is designed to fulfill the capabilities and requirements stated in JV 2010: Responsiveness, Deployability, Agility, Versatility, Lethality, Survivability, and Sustainability. The Objective Force has an offensive orientation; it fights on its terms, maintains initiative, and wins decisively. Units of Purpose, the Unit of Employment and Unit of Action are the corps, division, and battalion units. These forces dominate opponents by using "information superiority" and "the quality of firsts."

The Objective Force Unit of Employment (UE) and the Unit of Action (UA) are the building blocks for the conceptual operational and tactical framework, called Units of Purpose. The force designers used these conceptual names to ensure they did not constrain their thinking or

[58]U.S. Army. *United States Army White Paper Concepts for the Objective Force* (Washington D.C.: Department of the Army, 2000), i.

investigation with the current force structure. The UE responsible for the integration and synchronization of Army forces and serves as an Army Component Command, a Joint Task Force (JTF), or a Joint Force Land Component (JFLCC). It's warfighting focus is major operations and decisive land campaigns. Thus, it is equivalent to a corps, a field army, or a division. The UA is the smallest Army land combat force that the UE integrates and synchronizes in the joint environment.[60]

The organization of the Unit of Action is a combined arms battalion that has the operational concept of a combined arms brigade.[61] It is best comparable to a combined arms task force, but all of its capabilities are organic to the organization. It possesses organic reconnaissance and target acquisition, direct and indirect fire, air defense, engineer, and sustainment capabilities. It's a combined arms unit that has an offensive orientation and can conduct forced entry operations immediately from a strategic deployment. The UA fights tactical engagements by using integrated fires, maneuver, and assault.

The Unit of Action commander dominates his battle space based on the concept of "quality of firsts." The "quality of firsts" is, see first, understand first, and act first, decisively. This is what is termed "operating inside the enemies decision cycle" or Observe, Orient, Decide, and Act (OODA) or "OODA loop".

The "OODA loop" is an information and decision-making cycle described by Air Force COL John Boyd.[62] Boyd uses his model to illustrate how commanders use this four step mental process to make decisions.[63] The four step continuous process is – observation, orientation, decision, and action (OODA). The concept of the "quality of firsts" is made possible by new

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[59]Ibid, iv.
[60]TRADOC. *Draft TRADOC Objective Force Unit of Employment Concept* (Fort Monroe: Headquarters TRADOC, 2001).
[61]TRADOC, *TRADOC Pamphlet 525-3-91*, 5.
[62] McClure, William B., *Technology and Command*, 5.
[63] Roman, Gregroy A., *The Command or Control Dilemma*, 7.

networked information systems. Information superiority allows the Objective Force leaders to observe the enemy first, orient forces, decide, and then act, before the enemy.

OBJECTIVE FORCE TECHNICAL MEANS

The Objective Force UA uses advanced communication and information technologies that provide superior command, control, communications, computers, and intelligence, surveillance and reconnaissance (C4ISR) capabilities. It shares information horizontally and vertically through a computer network or "tactical infosphere."[64] The Unit of Action "gains and maintains information superiority."[65] The tactical infosphere and information superiority are the unique technical means the Objective Force uses in the command environment. Information superiority is the way the UA commander sees through the fog of war and eliminates uncertainty. Information superiority is the basis for the operational concept of the Objective Force and it is a discernible change in the uncertain or assumption based command environment of the Legacy Force.

Joint Publication 1-02 defines Information superiority as "the capability to collect, process, and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same." It is a "relative state" when a unit possesses a tactical advantage, because a commander has better quality information (current, accurate, and secure), that is timely (before the opponent), and the content (relevance) is complete. This "information advantage" is when one commander outperforms the other command in the information domain.[66]

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[64]Tactical Infosphere "fully networked communications with access to the global information grid (GIG) at the lowest tactical levels that provide real-time situational awareness and targeting with connectivity to joint, theater, and national sources." TRADOC, Draft TRADOC PAM 525-3-91, 13.
[65] TRADOC, *Draft TRADOC Pamphlet 525-3-9*, 8.
[66] Alberts, David S. and Gartska David S. *Information Superiority and Network Centric Warfare* (Information Warfare Society, 1999). Internet. Available at http://www.iwar.org.uk/iwar/resources/info-superiority1999.

The technology that allows the UA commander to gain and maintain information superiority is what *Draft TRADOC PAM 525-3-91* calls a "knowledge-based C4ISR architecture." C4ISR is used to conduct "network centric warfare." Some see network centric warfare as a Revolution in Military Affairs (RMA), and describe it as a shift from platform centric warfare to computer-network warfare.[67] Networked computer systems provide many businesses the competitive advantage by allowing their organizations information superiority over their opponent. Companies leverage knowledge within their organizations through sharing information within all levels of their organization. They use sensor systems, and command and control systems to monitor business transactions. The data gathered is analyzed and rapidly shared using computer networks. They use information and automated decision tools to act on business data, first.

Network centric warfare uses computer networks in a military organization to share information and knowledge horizontally and vertically. The networked force uses its computer network or tactical infosphere to connect, share, and collaborate information from sensors, to decision makers, and weapons systems. The network allows commanders to share information in all elements of the joint force, at all levels. Platform centric warfare links individual sensors to one combat system, controlled by one decision-maker, in one organization. The goal of the tactical infosphere is to give "battlespace awareness".

The history of warfare is full of examples of how commanders continually try to achieve battlespace or situational awareness. This is what Sun Tzu meant when he wrote, "Know yourself, know your enemy." This is the constant effort to eliminate uncertainty and reduce the fog of war. The Objective Force commander uses the tactical infosphere to link his organization to sensors inside and outside the battlespace. A sensor is an entity that has the task of sensing and

[67] Cebrowski, Arthur K. and Gartska, David S. *Network Centric Warfare: Its Origin and Future* (U. S. Naval Institute: 1998) [Internet]; available at http://www.usni.org/Proceedings/Articles98/PROcebrowski.htm., 2. "We are in a RMA unlike any seen since the Napoleonic Age."

includes any human or electronic device from the ground, sea, space, or cyberspace.[68] The UA commander has his own organic set of human and electronic sensors he deploys in his battlespace. The tactical infosphere links all these sensor inputs in a form that is viewable.

Soldiers, joint and organic surveillance and reconnaissance platforms transmit enemy data to the sensor network. A sensor system, linked to satellite based GPS, generates friendly positions. Additional sensors on weapons systems transmit ammunition, fuel, and crew status to the sensor network. The sensor network receives environmental and terrain information from satellites, and augmented sensors on weapons systems.[69] The tactical infosphere communication equipment transmits the shared view of the friendly, enemy, and environment. It is accessible to any soldier, headquarters, or leader connected to the network. This allows all the soldiers and leaders in the UA organization to see themselves, see the enemy, and see their environment.

The commander's shared battle space awareness does not give him information superiority over the enemy. He simply knows the combatant's locations and their identities. The UA commander uses his "knowledge-based force" and tactical infosphere to act and finish decisively. The UA concept document does not define "knowledge-based force." The Institute of National Strategic Studies calls it "Dominant Battlespace Knowledge" and defines it as "the ability to understand what we see and act on it decisively."[70] Understanding is part of the cognitive hierarchy.

The cognitive hierarchy is the process of receiving data, processing and filtering the data by computers, and transmitting it to a display. The computers are responsible for "improving and

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[68]"Standoff sensors can detect electro-optical, infrared, passive microwave, and reflected real or synthetic aperture radar. Close in sensors can detect pressure, magnetic fields, gravity differentials, sounds, and certain chemicals" Institute for National Strategic Studies. *Dominant Battlespace Knowledge*: *The Winning Edge* (Washington D.C.: National Defense University Press, 1995), 28.

[69] Alberts, David S., John Gartska, and Frederick P. Stein. *Network Centric Warfare: Developing and Leveraging Information Superiority. 2ed. Rev.* (Washington: Center for Advanced Concepts and Technology, 1999) 136-138.

[70]INSS, *Dominant Battlespace Knowledge,* ix.

not impeding the flow of information."[71] Additionally, the computer network includes automated decision aids, intelligent agents, simulation, modeling, and forecasting aided by artificial intelligence. The result is taking data, processing the data, and turning it into information. The system allows the commander to use the information it has gathered and processed in a logical progression of circumstance, decisions, and actions. The system assists the commander by providing the exact information on the display he needs to use cognition and judgment, to create knowledge.

TRADOC's concept of automated decision aids, intelligent agents, and use of artificial intelligence leads observers to believe that future warfare will eliminate the human control element.[72] Thomas Adam's fear is that intelligent agents "can analyze the environment and current battle situation, search likely targets, detect and analyze targets, assist in attack decisions, select and dispense munitions, and report results."[73] If this capability exists in the Objective Force systems, is there a need for a battle staff?

Dr. Howard Marsh believes it is important when using these concepts to understand the difference between situational awareness and knowledge, and how the knowledge-based force uses its advanced information technology or tactical infosphere. He refers to the decision aids, intelligent agents, simulation, modeling, and forecasting functions as Artificial Intelligence (AI) tools. He states, "they are not really intelligent – computers do not really think – but they do embody logical processes that are patterned after human problem solving processes." He further

[71]Ibid, 105.
[72]Adams, Thomas K., "Future Warfare and the Decline of Human Decisionmaking." *Parmaters* (Winter 2001/02): 58.
[73]TRADOC. "Concepts of Employment for Unamanned Systems (Draft)," 24 August 99, p 4.; quoted in Adams, Thomas K., "Future Warfare and the Decline of Human Decisionmaking." *Parameters* (Winter 2001/02) 58.

clarifies that these AI tools are not as perceptive as a Caesar or Napoleon but are a vital tool the commander uses to verify his decisions.[74]

The UA commander uses the tactical infosphere to share this knowledge with anyone connected to the network. This is the "common picture" or "common operating picture" (COP). The COP represents a display of the commander's visualization, or concept of the plan, friendly and enemy locations, and the environment in three-dimensional display. The UA concept states that the COP contains "operational concepts, schemes of maneuver, centers of gravity, and decisive points and vulnerabilities."[75] The common picture is the combination of the situational awareness information processed into battlespace knowledge. It includes key control orders and commander's intent for the mission. The common picture also includes logistics, movement control, air defense warning, and other information that is accessible through "pull down information carousels."[76] Anyone connected to the network from the squad leader to the brigade commander has the same battlespace knowledge. With this shared understanding of the battlespace, the UA is ready to act first.

OBJECTIVE FORCE PROCEDURES

The UA operational concept uses "a number of key tenets or conditions that will characterize all battalion operations." New "tactical paradigms" define the tactical command environment of the Objective Force. The new procedures are execution-centric command, streamlined MDMP, collaborative planning, and intuitive decision-making.

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[74]Marsh, Howard S. *Beyond Situation Awareness: The Battlespace of the Future (Draft)* (Office of Naval Research, 2000) [Internet]; available at http://www.onr.navy.mil/sci_tech/information/docs/beyond_sav.2.pdf., 6.
[75]TRADOC, *TRADOC PAM 525-5*, 12.
[76]Ibid, 3-5. "Information on services, or other activities including logistics, movement control, air defense warning, intelligence, and other areas can be readily accessed through pull-down information carousels." INSS, *Dominant Battlespace Knowledge*, 111. This type of data is accessible to anyone on the network and is used for "real time learning."

The "quality of firsts" requires the Objective Force commander and staff to use a "significantly new approach to managing operations…execution centric battle command."[77] Execution-centric battle command uses the advantages gained in information superiority and the philosophy of mission command. Mission command allows subordinates to exercise initiative within the commander's intent to exploit or respond to changes in the tactical situation. The Unit of Action concept lists superior situational understanding, the common operating picture, and streamlined procedures within the military decision-making process (MDMP) as the enablers that allow the commander to use this new approach to command.

The UA commander uses mission command for two reasons. First, the UA commander's battlespace is larger and includes multiple units conducting simultaneous decisive operations. The commander's span of control has increased from fighting a single battle to multiple simultaneous engagements. Secondly, leaders at all levels cannot wait on higher headquarters to think or direct their actions.[78] BG retired Wass de Czege believes the only way to maintain the "quality of firsts" and "high tempo" is to use mission orders and decentralized decision-making. He also believes the COP can "greatly streamline and accelerate sound and creative planning."[79]

The use of streamlined MDMP procedures is a result of the knowledge-based force and the necessity to speed the decision and planning cycles. Some believe the planning and execution cycle will merge into one continuous cycle called dynamic or compressed planning and decision cycles.[80] If the Objective Force commander is trying to eclipse the opponent's decision/action cycle, then he must use a "compressed decision timeline." Current planning doctrine does allow commanders to use abbreviated MDMP if time is constrained, but *Network Centric Warfare*

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[77]TRADOC, *TRADOC PAM 525-3-91*, 14.
[78]Scales, Robert H., Jr. *Future Warfare Anthology*. Rev. Ed. (Carlisle Barracks: U.S. Army War College, Strategic Studies Institute, 2001), 77. "A commander who lets the higher think will never be able to use the instruments at his command effectively."
[79]Wass de Czege, Huba, *New Pardigm Tactics and Tactical Organizations: How to Think about designing and fighting the Future Combat System based tactical organizations* (SAMS Ft Leavenworth, 2001). Electronic version, 28.

believes that the tactical infosphere changes the "way we reach decisions, allocate decision responsibilities, develop options, and evaluate them and the manner in which we choose them."[81] Since planning is a decision-making process, then information superiority changes the way commanders make decisions. "The plan, prepare, and execute phases of operations cycle merge into a relatively seamless blend between current and future operations."[82]

The MDMP is streamlined and more efficient because the commander uses "digital agents" that include automated decision support aids and comparative analysis tools.[83] BG Wass De Czege believes that these decision aids are capable of providing branch plans and sequels before the commander has to make a decision.[84] Johnson and Libicki believe the commander's knowledge based system offers the commander software that assists with visualization of the situation, allocates resources, generates and tests options, and predicts battle outcomes, in real time. When the commander decides on a plan, he electronically shares his vision with his subordinates and higher headquarters, instantly. This process ensures the plan has fewer adjustments and there is no need for branches and sequel, because it is executed right the first time.[85]

The next procedure of the Objective Force command environment is "multi-echelon collaborative planning." Based on the UA concept the commander's tactical infosphere and common operating picture, the information-sharing environment allows organizations more time to "complete planning and prepare for operations." *Network Centric Warfare* calls collaborative planning "virtual collaboration" which is a process that "exploits awareness." It relates collaboration to improving the product design process in industry. The organization is able to

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[80]Henry, Ryan and Peartree, Eward C., "Military Theory and Information Warfare," *Parameters* (Autumn 1998): 96. pg 74 "a merging of now separate planning and execution processes" pg 75
[81]Alberts, Gartska, and Stein. *Network Centric Warfare*, 73.
[82]TRADOC, *TRADOC PAM 525-3-91*, 14.
[83]Strategic Studies Institute, *AY Compendium Army After Next Project* (Carlisle Barracks: U.S. Army War College, 1998), 117, "Digital agents are computer based surrogates that posses a body of knowledge both about something (a process, a field of interest, a way of doing) and about you in relation to that something (your taste, your inclination, your acquaintances)."

quickly merge ideas from all sections of the organization. It is the concept of moving information instead of people to achieve "critical knowledge mass."[86]

The Objective Force Concept calls collaborative planning "creating a collective genius."[87] Collective genius is the simultaneous linking through the tactical infosphere of commanders and staff to "leverage the intellect, experience, and tactical intuition of leaders at multiple levels." Collective genius allows the commander to spend less time on the analysis of the plan and more time on leading. Additionally, subordinates provide simultaneous input on how they perceive their unit can contribute, and the resources they need to execute the plan. The result is a plan that leverages the collective genius of every echelon in the network, instantly shared intent, and reduced planning time. This is acting decisively first.

Multi-echeloned collaborative planning means several organizations from battalion to division work simultaneously on a plan in the tactical infosphere. *Draft FM 5-0* defines collaborative planning as "the real-time interaction of commanders and staffs at two or more echelons developing plans for a particular operation."[88]. The medium for the transition of information is by video teleconference (VTC), virtual whiteboards, and computer software that allow multiple users to make simultaneous inputs. This process reduces planning timelines and allows increased time for subordinate organizations to rehearse or create branch plans. Through collaborative planning the Army could move from the one-third/two-thirds rule to the 15 minute rule. The fifteen-minute rule means a brigade can complete its planning process fifteen minutes after the division.[89]

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[84]Wass de Czege, *New Pardigm Tactics and Tactical Organizations*, 27.
[85]INSS, *Dominant Battlespace Knowledge*, 100-101.
[86]Alberts, Gartska, and Stein. *Network Centric Warfare*, 36, 38, and 108.
[87]TRADOC, *TRADOC PAM 525-3-91*, 26.
[88]U.S. Army. *FM 5-0 Army Planning and Orders Production Initial Draft* (Washington D.C., Department of the Army, 2001), 1-17.
[89] Greer, James. "Collaborative Planning", School of Advanced Military Studies Class, 10 Oct 2001. The goal for collaborative planning could be 15 minutes.

The collective genius can extend to other subject matter experts connected to the network. This is a "pull down information carousel." This is information that resides in the global computer networks and is accessible whenever a commander needs additional data to make a decision.[90] The commander can instantly receive planning data from a regional expert at a university or research institute on his opponent or the indigenous population. He can gain a decisive edge by finding out what tactics his opponent used in past conflicts, and what type of theory he learned during military education. Why stop there? Before the commander executes his intended plan, he can warn the potential inhabitants of the region of the impending action and prevent loss of non-combatant lives.

The Objective Force commander uses Pattern Recognition and Options Acceleration to understand first. The UA concept explains it as the commander leveraging superior knowledge and his personnel experience based judgment. He uses this to "recognize patterns quickly and discern key elements of the current and emerging situation." The commander uses the tactical infosphere and his personal intuition to quickly decide the best course of action (COA) to develop. Then he uses the "modern decision aids and embedded models and simulations" to accelerate the decision-making. The new decision method and acceleration of the planning process gives the commander more time to develop a few good COAs in detail, and more time to develop branch and sequel plans. The UA concept calls this "optimizing analytical and intellectual energy."[91] It also appears that the commander's modern decision aids and embedded models and simulations make many staff positions redundant or obsolete.

Experimentation with knowledge based decision aids, course of action generators and analysis tools to assist the commander is ongoing. At UCLA the program uses the objectives of enemy and friendly commanders, forces available, and geography to predict the potential outcomes of a proposed course of action. Defense Advanced Research Projects Agency's

[90]Builder, Carl H. and Brian Nichiporuk. *Information Technologies and the Future of Land Warfar* (Santa Monica: Rand, 1995), 68.

(DARPA)[92] program uses a system of constraints that represent the possible tasks a unit conducts and then gives a feasibility, acceptability, and suitability value of the COA. The most modern example is the High Performance Knowledge Base (HPKB) Program. It uses a computer sketch program and speech recognition software to create the COA.[93] These are current examples of future COA design and analysis tools.

DARPA is working on a COA Critiquer that uses knowledge-based programs. DARPA develops knowledge-based programs as "importing ontogical knowledge from exiting knowledge repositories, and on teaching the agent how to perform various tasks, in a way that resembles how an expert would teach a human apprentice when solving problems in cooperation."[94] In layman's terms, the program leverages information gathered from subject matter experts, web resources, and problem solving theories. The goal of the critiquer is to evaluate the COAs based on existing evaluation criteria such as the principles of war and tenets of Army operations. Battlefield Visualization and Mission Planning System (BPV) is in use at Ft Hood. Commanders use it to gain a shared understanding of the plan by using its animation scenarios. [95]

Lastly, the Objective Force commander uses intuitive decision-making. He uses the pattern recognition models he acquired while using his automated knowledge based planning and rehearsal tools. Gary Klein in *The Sources of Power* explains that decision makers often use their experience "to recognize key patterns that indicate the dynamics of the situation."[96] He further explains that the patterns people see are not always obvious and they do not know they are using

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[91]TRADOC, *TRADOC PAM 525-3-91*, 14-15.

[93]Defense Advanced Research Projects Agency. "DARPA High Performance Knowledge Base Program," (DARPA, 1999) [Internet]; available at http:reliant.teknowledge.com/hpkb/meetings/Leavenworth041499/Jones/sld009.htm.

[94]Gheorghe, Boicu, Marcu, and Burke, *An Innovative Application from the DARPA Knowledge Development of a Course of Action Critiquer* (DARPA HKPKB and RFK Programs in Knowledge Base Development, 1999). [Internet]; Available at, http://lalab.gmu.edu/publications/data/2001/COA-critiquer.pdf.

[95] US Army. "Battlefield Visualization and Mission Planning" (U.S. Army CECOM, 2002) [Internet]; available at Http:// www.monmouth.amry.mil/cecom/rdec/techtrans/opps/opps_bp.htm accessed 7 Feb 02. "The BPV provides visual tactical assessment and course of action generation and analysis, plan generation and refinement, plan preview, rehearsal, and synchronization,"

them to make decisions. He calls the process Recognition Primed Decision Making (RPD). The visual pattern and experience of the decision maker allows the use of intuitionand makes a quicker decision.[97] The Objective Force commander uses his tactical infosphere to see and understand first, and then uses his automated decision aids, pattern recognition, and intuition to act first.

The automated rehearsal tools and COA critiquer are enablers that allow the commander to act before the enemy. The Objective Force commander uses the networked system to visually test and rehearse the potential reactions against the enemy model in the software, and builds some identifiable mental patterns of enemy. As the commander executes his plan, he recognizes patterns of enemy responses and directs his organization to act quicker than the enemy. Gary Klein uses as an example of a fireman's years of firefighting, as his pattern recognition database. He then rapidly and unconsciously uses it to make intuitive decisions. The Objective Force commander also uses his personal experience and the experience of his knowledge database to react even faster. As he makes a decision, his networked system communicates the decision and its visual components to his subordinates and superiors.

The next step is to ensure his subordinates understand the mission, his intent, and how and when each section of the organization contributes. This is back brief, rehearsal, and synchronization before execution. The objective force concept states that all of the command enablers described in the tactical C2 environment allow a new paradigm. The "fully networked forces will adjust rapidly to changing situations and self-synchronize their efforts, with minimal intervention or direction required from higher echelons."[98] If the networked subordinate and higher echelons do not need any support to rehearse or synchronize the plan, does the commander need a battle staff?

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[96]Klein, Gary, *Sources of Power* (Cambridge, MIT Press, 1999) 31.
[97] Ibid, 33. Intuition is "Recognizing things without knowing how we do the recognizing."
[98]TRADOC, *TRADOC PAM 525-3-91*, 15.

Synchronization is "an output characteristic of the C2 processes that arrange and continually adapt the relationships of actions (including moving and tasking forces) in time and space in order to achieve the established objective(s)."[99] *FM 6-0 DRAG*, the Army's draft C2 doctrine, recognizes the power of the commander's tactical infosphere and its impact on the way commanders synchronize their operations. It addresses the ability of the commander to use his common operation picture to "integrate and synchronize operations."[100] Self-synchronization is possible by all units in the organization by sharing the same understanding of the situation simultaneously. The paradigm shift is from the commander and his staff synchronizing operations, to subordinate commanders and leaders using the commander's intent as their guide, and adjusting control measures and boundaries instantly to exploit an enemy weakness. This is instantaneous and eliminates moving back into the planning cycle.[101]

OBJECTIVE FORCE ORGANIZATION

The Objective Force commander uses the tactical infosphere to "virtually" communicate vertically and horizontally to anyone connected to his network. He commands from anywhere in his battlespace and is not tied to the fixed tactical operations center (TOC). The Unit of Action operates in a different command environment called "C2 on the move" or "near TOC-less environment." The concept is the that commander can use a "highly distributed, mobile command post." The Unit of Action concept calls this "untethered" and the commander can continually interact with subordinate and higher headquarters, while simultaneously moving throughout the battlespace.[102]

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[99]David Alberts and others, *Understanding Information Warfare* (Washington D.C.: CCRP, 2001), 206.
[100]U.S. Army. *FM 6-0 DRAG Command and Control* (Washington D.C., Department of the Army, 2001), 5-29.
[101] Ibid. "Army units will be able to adjust execution on the fly, mitigating the traditional planning regimen of the past."
[102]TRADOC., TRADOC PAM 525-3-91, 15. The terms TOC-less environment, C2 on-the-move- and untethered are all used to describe the command posts in this environment.

From the invention of the telegraph to the present, organizations have tried to "untether" commanders from their electronic communications equipment and command post. This is an attempt to move back to command by influence. The tactical infosphere is potentially the same as Napoleon selecting the best hilltop on his battlefield to view and direct the battle. The commander is free to move to the spot on the battlefield where he can best influence the fight. DARPA experimented with this concept during its Command Post of the Future (CPOF) research. DARPA discovered that in a division sized organization there were 1100 leaders that are included in decision-making teams, but only seven actually make decisions. DARPA started with the idea that a command post or TOC is a function, and not a stationary tent or van. The CPOF provides digital situational awareness that the tactical infosphere gives the Objective Force commander. They place three to five people and networked systems in a vehicle the size of a HMMWV (Highly Mobile Multipurpose Wheeled Vehicle) this provides mobility, survivability, and "creates an adaptive, decision-centered, information visualization environment for the commander and his future staff."[103]

Although the Objective Force concepts do not describe the command post on the move, it is potentially similar to the Army's Command and Control Vehicle (C2V) program. The C2V is "a tracked, armored vehicle designed to provide an automated tactical command post for mobile operations."[104] The C2V replaces the Corps and Division Tactical CP and the Tactical Operations Center (TOC) at Battalion and Brigade. It houses all the communications and computer systems necessary to operate the Army Battle Command System (ABCS). The vehicle has four ABCS workstations and provides the maneuver staff with the same degree of speed and mobility of other combat systems. If the C2V only has four workstations for staff officers to access the ABCS

[103] Wilson, J. R., "US Military Researchers Take Aim at Command Post of the Future" (*Military & Aerospace Electronics*, Oct 2000) 3.
[104]FAS Military Analysis Network. "M4 Command and Control Vehicle (C2V)" [Internet]; available at http://www.fas.org/man/dod-101/sys/land/c2v.htm. 1.

(Army Battle Command System or tactical infosphere), then making command posts mobile causes the battle staff to get smaller.

In summary, the Objective Force command and control environment is a "significantly new approach to directing and managing operations."[105] The Objective Force uses new procedures, technical means, and command post organization. The Objective Force commander uses his tactically networked force to gain and maintain information superiority, and uses execution-centric battle command. Execution-centric battle command leverages the advances in the knowledge based force operating in a network centric warfare environment. The commander's tactical infosphere allows him to exploit the collective genius and use collaborative planning and streamlined MDMP to see the enemy first. He then uses mission orders to empower his subordinates to exercise initiative to their shared adaptive and self -synchronizing plan. The commander uses a merged and continuous plan, prepare, and execution cycle. Throughout this process, the commander uses the tactical infosphere and his personnel experience to recognize patterns of enemy actions, and his automated decision aids to accelerate his generating of options. The commander can "virtually" command from anywhere he chooses by using his C2 on the move capability and his mobile COP module that is potentially the same as today's PDA (Personal Data Assistant).[106]

This new paradigm has proponents and skeptics. Dr Adams believes that networked warfare makes it "impossible" for humans to C2. This causes a decline in human decision-making.[107] This new type of command allows the opportunity to conduct simultaneous decisive operations in a non-linear environment. Colonel Harig, in "The Digital General", believes that the future "Nintendo warriors" can handle these multiple complex operations just as kids adapt to newer and better video games. Lastly, the decision-making and command process changes from

[105]TRADOC, TRADOC PAM 525-3-91, 14.
[106]Wass de Czege, New Pardigm Tactics and Tactical Organizations, 28 He calls them "mobile COP modules" that provide a common operating picture.

a deliberate to initiative based process with less need for human links.[108] Has the Objective Force technology made warfare easier or more complex command and control? This determines whether the commander needs a battle staff.

INFORMATION AGE BATTLE STAFF?

Does the Objective Force Unit of Action need a staff when operating in a new command environment of the "quality of firsts"? This section uses the new procedures, organizations, and technical means to decide if the commander needs a battle staff that manages information, makes decisions, and provides visualization. The technical means in Objective Force is the tactical infosphere that provides information superiority. The procedures are execution centric battle command, collaborative planning and streamlined MDMP, self-synchronizing forces, and intuitive decision-making. Lastly, the near TOC-less environment is the new organization. Does the commander need a battle staff?

TECHNICAL MEANS

The Objective Force commander's technical means, or tactical infosphere, provide the commander fully networked communications connected to the global information grid. This allows his forces to gain and to maintain information superiority. Simply put, he has fused and integrated information on his forces, the enemy, and the environment. The goal of information superiority is to eliminate uncertainty for friendly forces while increasing the "fog of war" for our opponent. How does the enhanced technical means affect the battle staff?

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[107]Adams, Thomas K., "Future Warfare and the Decline of Human Decisionmaking," *Parmaters* (Winter 2001/02): 58.

[108]Henry, Ryan and Peartree, Eward C., "Military Theory and Information Warfare," *Parameters* (Autumn 1998): 126."Decision cycles for commanders and soldiers would be both compressed and enriched, accelerating Warfighting, demanding more initiative-based, decentralized decision-making, reducing personnel in the field and on the staff, and eliminating much of the noise, error, and viscosity normally inserted by human links."

The Legacy Force battle staff uses voice communications, eavesdropping, and cross-talking, and reports matrix to collect data. They analyze this data to provide the commander with information he needs to visualize the status of his soldiers, the enemy, and the environment. The analysis process requires time, so the information is not in real time. This system can increase uncertainty. The staff uses raw data and limited experience to turn the information into less than perfect understanding.[109] If tactical infosphere replaces the battle staff, using knowledge-based programs and real time information via the COP, then the commander has *Dominant Battlespace Knowledge.*[110]

David Alberts believes the commander's visualization provided by his networked C2 system allows instant assessment of different layers of the battlefield, and better certainty for his own force and the intentions of the enemy. "The role of staffs is significantly reduced" and "communications and processing resources" are reduced.[111] BG Wass de Czege believes logistics units are smaller and more efficient because of information systems. He states that "concepts of organization for information gathering" when information systems are sufficient and reliable, require restructuring.[112] The need for a battle staff organization that is gathering, processing, and managing information to provide the commander his visualization and situational understanding is not necessary.

Lastly, does the commander need a battle staff that is continually making staff decisions? Will the commander reach information overload? David Alberts believes that automation eliminates the need for staffs to manage routine information, because network centric warfare "moves us into a world where many decisions can be made with somewhat perfect

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[109]Harris, Chesley. *Battle Staff Proficiency* (Ft Leavenworth, Center For Army Lessons Learned, 1995) [CALL database on-line]; available at http:///calll.army.mil/products/ctc_bull/95-11. "Battle staffs do not appear adequately proficient in planning, preparing, and executing combined arms missions."
[110]INSS, *Dominant Battlespace Knowledge,* 7. "Merging our increasing capacity to gather real-time, all weather information continuously with our increasing capacity to process and make sense of this voluminous data builds the realm of dominant battlespace knowledge."
[111]INSS, *Dominant Battlespace Knowledge,* 98.
[112]Wass de Czege, *New Pardigm Tactics and Tactical Organizations,* 28.

information."[113] Thomas P. Barnett believes that commanders will be overloaded "with an ever-increasing flow of data masquerading as information because it has been slickly packaged within the common operating picture"[114] The commander needs a battle staff that makes decisions because currently, and in the near future, computers cannot exercise judgment.[115] Information systems make simple data management decisions, provide possible solutions, but do not make recommendations to complex decisions.[116] The commander's system can filter data, and recognize patterns, but cannot turn information into knowledge. "Future staffs will spend their time assigning meaning to information."[117]

PROCEDURES

The old paradigm of the one-third/two-thirds rule is obsolete in the Objective Force. The commander uses the new procedures of execution-centric command, streamlined MDMP, collaborative planning, and self-synchronization. He uses his knowledge-based decision aids to streamline the MDMP and collaborates via the tactical infosphere. This reallocates planning responsibilities. In the Legacy Force, generating and evaluating options took place in one organization or in parallel, but not efficiently. Now, planning and decision-making is collaborative or distributed. Additionally, planning and decision-making resides in the organization or outside the organization. The commander's network leverages the collective genius of his subordinate commanders and higher headquarters. It is simultaneously generating options for the next mission. If the commander can instantly leverage the knowledge of the

[113]INSS, *Dominant Battlespace Knowledge*, 97.
[114]Barnett, Thomas P.M., *The Seven Deadly Sins of Network-Centric Warfare* (U.S. Naval Institute, 1999) [Internet]; Available at www.nwc.navy.mil/dsd/7deadl~1.htm.
[115]Keegan, John. "Computers can't replace judgement," *Forbes*, 2 December 1986, 37.
[116]David Alberts and others, *Understanding Information Warfare* (Washington D.C.: CCRP, 2001), 154.
[117]Wass de Czege, Huba and Jacob Biever. "Optimizing Future Battle Command Technologies," *Military Review 78* (March-April 1998): 4.
Wass de Czege and Biever, Optimizing Future Battle Command Technologies, 4.

network, of his subordinate commanders, and of his higher headquarters planning element, does he need a battle staff for information management or decision-making (planning)?

Collaborative planning and using a streamlined MDMP encompasses all the essential tasks the battle staff provides the commander and contributes to the commander's decision-making. Alberts, Gartska, and Stein believe network centric warfare changes "the way we reach decisions, allocate decision responsibilities within the organization, develop options and evaluate them, and in the way we chose them." The commander's knowledge-based system for planning generates a relevant common picture of the situation. The system generates options based on doctrine and its knowledge base. It also assesses viability, calculates resources, and allows collaboration during each step. When the commander makes a decision, the system communicates guidance, visualizes, briefs and rehearses the options for subordinates.[118] The time saved using these procedures allows the commander to act first.

Wass de Czege and Biever believe that future staffs need to change their focus. The potential exists for them to "greatly streamline and accelerate sound and creative planning." Technology fundamentally changes command and planning relationships, but there is not prediction on the effects of the battle staff organization. Staffs and commanders need to "maintain traditional skills and provide purpose and motivation." They believe that staff officers will continue to make decisions for the commander. "Leaders will have access to more decision-relevant information than ever before, but there will be too little time to consider it sufficiently. They will have to trust others who have the responsibility to do the right thing."[119] Battle staff decision-making is still required even when trusting subordinates through decentralized command.

The Objective Force commander uses collaborative planning to merge the planning and execution cycle into one continuous self-synchronizing process. In the Legacy Force,

[118]Wass de Czege and Biever, Optimizing Future Battle Command Technologies, 15.

synchronization is a continuous process in planning and execution. During planning, the battle staff synchronizes the plan on a matrix to combine battlefield effects during execution. This is an information sharing or coordination procedure. During execution the battle staff monitors multiple communication networks to de-conflict and combine effects of higher and lower units. The synchronization process is a combination of information management and deciding-making. When all leaders in the Objective Force UA have the same common picture, there is no requirement for a battle staff to synchronize, or manage information and make decisions.

According to *Understanding Information Warfare*, self-synchronization is a combination of high quality, high volume, and depth of information in a system. The level of synchronization increases when the organization shares high quality information within multiple levels of the network. "A high degree of information sharing and collaboration permit dispersed elements to rapidly adjust plans, schedules, and actions in accordance with changes in the situation."[120] Self-synchronizing forces are possible if the commander uses decentralized command or mission command.

Mission command has been in our operations doctrine since 1993 and informally since World War II. The Objective Force commander exercises the most advanced concept of decentralized command, execution-centric battle command. Mission command takes advantages of the collective situational understanding provided by the tactical infosphere. At all levels, leaders see and understand the situation, and can exploit the advantages of combined situational awareness. Decentralized command shifts the emphasis of decision-making from the staff to the commanders.

Execution-centric command is decentralized command or command by influence. Command by influence uses the commander's intent as an "outline of minimum

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[119] Ibid.
[120]David Alberts and others, *Understanding Information Warfare* (Washington D.C.: CCRP, 2001), 217.

goals…effectively influencing all of the forces all of the time."[121] This type of command is advantageous when uncertainty is high, situational awareness is low, and capitalizes on subordinate commanders recognizing when to take initiative. The Objective Force commander uses pattern recognition to reduce the amount of time it takes to visualize a plan and communicate it to his subordinates. The national research council calls this command by negation. If subordinates understand the battlefield and the commander's intent, then they can act on their own initiative within the intent. The commander only commands by negation, or whenever his intent changes.[122]

The book *Understanding Network Warfare* describes the effects of the new procedures of collaboration and decentralized command. A highly networked force, with high decision and planning collaboration, is self-synchronizing and can decentralize its command and control. The gain is in, "speed of command." It is the commander's ability to rapidly adjust plans while "locking out enemy strategies" and "organizing complex warfare activities from the bottom up."[123] The higher the level of these elements, in combination, results in a higher level of efficiency and effectiveness. If the commander tries to centralize command decisions, it decreases the level of synchronization, which affects unit effectiveness. The procedure of execution-centric command shifts visualization, decision-making, and information management from a staff-centric process to a command-centric process eliminating the need for a battle staff.

The procedures of intuitive decision-making and pattern recognition are not new to warfare. Clausewitz wrote of "*coup de' oeil*"[124] in his book, *On War*. The ability of a commander to instantly see and understand the pattern of what is unfolding on the battlefield is the same as Klein's Recognition Primed Decision-making (RPD). Clausewitz's concept worked

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[121]Czerwinski, Command and Control at the Crossroads, 4.
[122]National Research Council. *Realizing The Potential of C4I: Fundamental Challenges* (Washington D.C.: National Academy Press, 1999) 189.
[123] Cebrowski and Grarstka, *NCW*, 23.
[124]Clausewitz, Carl V. *On War*, trans. Michael Howard and Peter Paret (Princeton: Princeton University Press), "Any sound decision taken in midst of action – such as recognizing the right point to attack

well until the commander's battlespace became too large for him to personally view. GEN Schwartzkopf used the most sophisticated C2 system in modern warfare, but Paul Harig believes his decision on when to begin Desert Storm was "largely intuitive, personal, and private."[125]The near real time graphic display of the situation allows the commander to recognize unfolding patterns of activities. He then uses his knowledge and experience to intuitively visualize the outcome. The common operating picture allows the commander to "analyze patterns of operations, identify enemy courses of action, and recognize systemic vulnerabilities."[126]

Napoleon's advantage of a hilltop view of the battlefield has returned. It is the end of "paralysis by analysis." This is when the battle staff is ineffective due to data and analysis overload. The commander looks for opportunities, not additional data. While the commander is using his Common Operating Picture (COP) to monitor the current battle, he is intuitively evaluating plans for future engagements. Intuitive decision-making and using the knowledge-based tactical infosphere to recognize patterns moves the burden of managing information (CCIR), visualization, and decision-making from the battle staff to the commander. This is another procedure that eliminates the battle staff.

ORGANIZATION

The commander's tactical infosphere eliminates the need for a Legacy Force three level, linear, command post (CP) organization. He commands from anywhere on the battlefield with his portable command module. The future C2V provides the commander mobile C2. This is a near TOC-less environment. The commander does not rely on radios and nine communication networks to interact with his battle staff or higher headquarters. The network integrates

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etc…more commonly the inward eye." 102.
[125]Harig, Paul T., "The Digital General: Reflections on Leadership in the Post-Information Age," *Parameters* (Fall 1996): 133.
[126]Wass de Czege, *New Pardigm Tactics and Tactical Organizations,* 27.

everything into a COP. This frees the commander from the command post and from the battle staff.

Legacy Force Main CP and the TAC CP align one behind the other and their mobility is limited to the range of their communications equipment. If the commander has real-time information on his COP, can pull plans, orders, and additional information from any computer on the network (to include higher-level staff organizations) does he need a Main or Rear CP in his battle space? If the Main and Rear CPs are part of the network, then they are "virtual" command posts located anywhere in or out of the commander's battle space. This eliminates the need for a battle staff that operates within communications range of the TAC, and provides visualization, information management, and staff decision-making.

The C2V has four stations for ABCS operators that travel with the commander in the Legacy Force TAC. If the battle staff is now virtual and outside the commanders battlespace, then who operates these four stations? Does the commander need a fire support officer, intelligence officer, operations officer in his C2V or can they provide their duties virtually? The Unit of Action concept provides a new TOC-less organization, but does not explain if or how the battle staff fits in this organization.

Information overload is the most common criticism of the Objective Force concept. The advances in C4ISR, intelligent agents, automated decision-aids, information filters, and common operating pictures overwhelm one person with information. Thomas Adams says "the proliferation of information-based systems will create an environment too complex for humans to direct."[127] The book *Future Warfare* is more cynical. It says that information technology is "drowning" commander and staffs and that "information technology will not simplify the decision-making process, but in fact makes it more complex."[128] Paul Harig believes that the use of information technology is going to produce "digital generals" that suffer from information

[127]Adams, Future Warfare and the Decline of Human Decisionmaking, 58.
[128]Scales, *Future Warfare Anthology*, 51.

"paralysis by analysis" and they will neglect their intuitive skills that allow them to make quick decisions.[129]

The battle staff exists to help the commander make decisions. The Objective Force concept of "quality of firsts" uses the theory of network centric warfare. The Objective Force commander gains and maintains information superiority, and the tactical infosphere provides "near perfect" understanding of his battlespace. The technical means allows the commander to make decisions faster and operate inside the enemy's decision cycle. The same technical means allow the procedures of execution-centric command, collaborative planning, self-synchronizing forces, and intuitive decision-making. The technical means provides a TOC-less organization. The commander acts faster than the enemy, reduces planning times, and eliminates the organization (battle staff) that provides these tasks in the Legacy Force. Does the commander need a battle staff that provides his visualization, makes decisions, manages information, using voice communications networks, and an analytical planning process? The answer is clearly no, but it is obvious that the Objective Force requires a different type of battle staff, an information-age battle staff.

CONCLUSIONS AND RECOMMENDATIONS

Vice Admiral Cebrowski and John Garstka compare network centric warfare to a business. Information management and networking efficiencies change the way business's make decisions and structure their organization. They believe the same effects relate to military organizations. Networking speeds command decisions and allows the C2 system to organize from lower to higher. The paradigm of "no plan survives initial contact" is gone. Situational awareness eliminates the need for detailed planning. They believe this theory requires the military

[129]Harig, Digital General, 138.

to accept "the co-evolution of technology with operational concepts, doctrine, and organization."[130]

The current battle staff organization is traceable back to the Prussian and French model of the 1800s and according to Hittle the American Revolution. During the Industrial Revolution, businesses adopted the military hierarchical command and staff model, because it was the most efficient way to organize individuals and allocate resources.[131] These hierarchies and staff designs allow organizations to process and filter information at different levels to ensure the "correct" information makes it to the top. Information technology and networking has changed this model. Supervisory and control levels of the organization become obsolete. The efficiencies reduce the hierarchy, but it is not eliminated. Decision authorities, at some level, still exist. Additionally, sharing information with knowledge workers increases advantages at every level of the organization, and fosters initiative and creativity. The entry-level employee has access to the same data as the Chief Executive Officer. This is not possible in a "stove piped" organization. The U.S. military is not Wal-Mart or Sears, but possess the same characteristics as an adaptive complex system.

How does networking relate to military organizations? First, the network allows the organization to rapidly share information. This flattens the hierarchy of the organization. Although the Army currently uses mission orders, networking allows decentralized decision-making at the lower levels. Everyone sees the common picture. The bypassing of hierarchies, speeds the amount of time it takes to make and transmit decisions. This linking of the sensor, the decision maker, and the weapon system to increases the speed of action. The network affords collaboration. This changes the way organizations make decisions and plans. Many fear that robots and machines will take over warfare and commanders will become obsolete. All of these

[130]Cebrowski and Gartska, *Network Centric Warfare: Its Origin and Future*, 14-16.
[131]Builder, Carl H. and Brian Nichiporuk. *Information Technologies and the Future of Land Warfare* (Santa Monica: Rand, 1995) 28.

optimizations are possible through information management of computer systems, but computers do not have judgment and common situational understanding is not common.

Human activities control the tempo of warfare. In the past, the mental speed of the commander and the staff "did not substantially constrain the conduct of war."[132]Regardless of information superiority, the commander still executes judgment in all decisions. This is important for two reasons. First, execution-centric command shifts the tempo of warfare from the commander and staff, to the commander(s). Second, the tempo directly relates to the level of the commander's situational understanding.

To reach decision or judgment dominance over the enemy, commanders need to attain common situational understanding. Even when sharing the same common picture, understanding is personal. Each person looking at the common picture views it, and interprets its meaning using their own personal experience and values. These are the lenses they use to interpret and evaluate the information, to create knowledge. Each commander is using his personal judgment and understanding of the common picture. Rather than the commander synchronizing the collective minds of the battle-staff, he is synchronizing the minds of his commanders.

The book *Network Centric Warfare* believes the military's command and control structure was "developed for a different time and a different problem."[133] The current staff model was created to provide order and reduce the fog and friction of warfare. The organization has a functional design: intelligence, personnel, logistics, and operations. They analyze data for the commander, by function, to create a common picture of the battle space. The larger the organization, the harder it is to assemble the collective knowledge of the organization into a

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[132]McClure, William B. *Technology and Command: Implications for Military Operation in the Twenty-First Century* (Maxwell Air Force Base: Air University, Center for Strategy and Technology, July 2000) 19.
[132] Alberts, Gartska, and Stein. *Network Centric Warfare*, 71.
[132]See, Sauer, Gary G., "Battle Staff Integration: The Key to Battle-Tracking in Battalion Command Posts" (Monograph, School of Advanced Military Studies, 1996). Olmstead, Joseph A. *Battle Staff Integration*. (Alexandria: Institute For Defense Analysis, 1992).
[133]Alberts, Gartska, and Stein. *Network Centric Warfare*, 71.

coherent common picture of the situation. The current battle staff is so large and complex that entire research studies and monographs focus on how they can function as a team and provide the commander his visualization.[134] Martin Van Creveld chronicles this scenario in his book *Command in War*.

Van Creveld states that when a military organization is confronted with the task of reducing uncertainty, it "increases its information processing capability" which in turn leads to an increase in communications networks and "an increase in size and complexity of the central directing organ."[135] Thomas Czerwinski believes that the Army's information modernization efforts directly relate to the function of command. He believes that information systems move the function from command by plan to command by influence. Command by influence is the same as mission command or execution-centric command. The Objective Force concept changes the Army's process of information management, situational awareness, and command function, but it does not address the battle staff organization.

Major Taylor's monograph on the Army staff is recent historical evidence for the need to change battle staff organization. The monograph illustrates how the Army modernized and added new technology, made organizational and forces structure changes, but the doctrine and staff structure has not changed since World War I. The effects of not modernizing the battle staff affected 3rd Armored Division in Desert Storm. It outran its traditional command post displacements and improvised. It created smaller echelons of the TAC and Main CP. It also had to add staff officers to man them.[136] The Objective Force concept states the Unit of Action "maintains a high operational tempo" with the potential of "simultaneous engagements" and with a "linear or non-linear framework."[137] This means the battle staff needs to become more mobile,

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[134]See, Sauer, Gary G., "Battle Staff Integration: The Key to Battle-Tracking in Battalion Command Posts" Monograph, School of Advanced Military Studies, 1996. Olmstead, Joseph A,. *Battle Staff Integration*. Alexandria: Institute For Defense Analysis, 1992.
[135]Van Creveld, *Command in War*; quoted in Czerwinski, Command and Control at the Crossroads, 124.
[136]Taylor, *U.S. Army Staffs Are They Broken*, 37.
[137]TRADOC, *Draft TRADOC Pamphlet 525-3-91 Unit of Action Concept, 8.*

agile, and smaller to keep pace. John Schmidt believes the organization needs redesigning based on complexity theory.

Schmidt believes the "Newtonian Paradigm" of the 16th Century describes the current staff organization. He uses a metaphor of a clock. It has precision gears, meshing perfectly, and "measurably and reliably, keeping perfect time." The metaphor illustrates the similarities between the military and modern machinery. Western warfare is mechanistic and works on the "laws" of combat and a linear cause and effect relationship. Additionally, within this model, warfare is a closed system in which the commander and staff seek an optimal solution to any problem. Does this sound like the MDMP?

This mechanistic Newtonian model describes the current C2 and staff procedures. The more knowledge workers and communications systems, the better the organization can impose "order, precision, and certainty" and make warfare work like "clockwork." Schmidt believes this paradigm results in centralized control, precision plans, and detailed synchronization matrix. He states the goal of Newtonian command and control is to "gain certainty and impose order." According to Schmidt control organizations are dynamic in non-linear warfare.[138]

The Objective Force operates in a complex open system that is never in a state of equilibrium. It is a "complex, distributed system." A complex system interacts "freely in interconnected and unanticipated ways" and therefore is complicated and unpredictable. [139] Therefore, warfare is uncertain and uncontrollable. Schmidt believes this means that military organizations synchronize and order from the bottom to the top. Mission orders and adaptive

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[138]Alberts, David S. and Czerwinski, Thomas J. ed. *Complexity, Global Politics, and National Security* (Washington D.C.: National Defense University, 1997) 219-246.

[139]Ibid, 223-224 A complex system is, "Any system composed of numerous parts, or agents, each of which must act individually according to its own circumstances and requirements, but which by so acting has global effects which simultaneously change the circumstances and requirements affecting all other agents. Complex systems are based on the individual "decisions" of their numerous agents."

evolutionary planning are the best method.[140] The commanders organize, with less staff officers using adaptive verses detailed planning and synchronizing.

The Army conducted several war fighting experiments to analyze and to demonstrate the concepts of the Objective Force. The Vigilant Warrior experiment in 2001 analyzed the Objective Force Corps as part of a Joint Task Force. This war game "demonstrated the utility of the general-purpose Objective Force optimized for full spectrum dominance."[141] This is commensurate with Admiral Cebrowski's assertion that network centric warfare is not a theory, and is only valid at the joint level. Does it work at the tactical level?

In 1997 the first Division Advanced War fighting Experiment was conducted as part of the 4th Infantry Division (I.D.) Warfighter to "underpin the definition and development" of the future digital Army. 4th I.D. is the first Army division to undergo transformation to a digital unit using the Objective Force concept. The Chief of Staff of the Army directed the 4th I.D. to conduct a demonstration exercise to "affirm" the progress of the Army's digital Army Battle Command System (ABCS), which is the first tactical infosphere. 4th I.D. conducted Digital Control Exercise I (DCX) at the National Training Center (NTC) in March 2001 with two maneuver brigades, the division TAC CP, and Corps level CSS units. DCX II was a Command Post Exercise using Brigade and higher-level command posts.

The purpose of DCX II was "to demonstrate the decisive qualities of the 4 ID in sustained land combat and the significance of information as an element of combat power." One of the four objectives was to assess the information advantage in battle command. The tactical infosphere is functionally designed. It emulates the way each battle staff member functions in the command post. There is a system for maneuver, intelligence, artillery, air defense, and logistics. They all provide information to the common operating, or Maneuver Control System (MCS). Additionally, they connect to joint systems.

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[140]Ibid, 234-238.
[141]U.S Army. *Transfromation Wargame 2001* (Carlisle, U.S. Army War College) 2.

The 4th I.D.'s use of the tactical infosphere via the ABCS provided "enhanced situational awareness" that allowed the commander to "visualize better, decide quicker, and direct action more decisively than the opponent." Additionally, the Division demonstrated that it successfully networked the force to joint systems. However, the current doctrine and leader training limited "their capability to fully exploit information superiority." The command and battle staff organization was "cumbersome" and prohibited them from leveraging the additional speed in decision-making over the opponent. The report states that the information technology is "tremendously powerful," but situational awareness did not create situational understanding.

4th I.D. demonstrated they could displace command posts and not lose tempo. The report states that this is a positive sign, but it is not maximizing the use of digitization. Battle staff functions relocated to different command posts during displacements, but could not function. Additionally, when they moved from one CP to another, there was no place for them to work. The report states that the multiple command posts, with multiple staffs, needs changing. The tactical infosphere allows small, mobile command posts, with smaller staffs and increased tempo.[142]

DCX II demonstrates that command is moving from command by plan, to command by influence, and a commander-centric model of decision-making. The initial report clearly states that decision-making methodology was intuitive, based on pattern recognition. The report states that the current MDMP does not fit this model and it "needs to be adapted." If the Army adapts the MDMP and begins retraining leaders to excel in pattern recognition and intuitive decision-making, then the battle staff organization needs to adapt.

The report states that the commander had "much improved situational awareness," however it did not "equate" to understanding. The result is missed tactical opportunities created

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[142] Wass de Czege, *New Paradigms Tactics and Tactical Organizations*, 28. "Information technologies would allow much smaller staffs to multiply in productivity and effectiveness." TRADOC, *TRADOC PAM 525-5*, 4-6. "Digitization of the battlefield and other advances in information technologies will result in

by collective situational awareness. This is a shift to commander/leader-centric operations. The report indicates the need to change the doctrine of the analytical decision-making model to an adaptive model based on "rapid intuitive decision-making." This allows the Army to reduce or possibly eliminate multiple command posts and the staffs.[143]

The results of DCX II support effects of network centric warfare. The organization that exercises C2 needs to adapt to take advantage of the decision-making superiority that the system creates. The books *Network Centric Warfare, Dominant Battlespace Knowledge,* and *Future Warfare* all agree on how organizations change. Organizational hierarchies "flatten" and the role of staff officers in their decision-making and information management processes are not necessary.[144]

What kind of battle staff does the Objective Force unit of action need? This monograph offers three suggestions: the virtual battle staff, the battlefield information staff, and the networked Army. The recommendations made in this monograph are for discussion, simulation, and experimentation. They use the theories of network centric warfare.

The virtual battle staff concept is moving knowledge and information rather than personnel, or "Battle command via video teleconference (VTC)." Network Centric Warfare describes this type of staff collaboration as "achieving critical knowledge mass." The commander and staff use VTC, and whiteboards to interact. The concept is in use today. During division Warfighting exercises, units collaborate via VTC between the TAC CP, Main CP and Rear CPs in real-time.

The battlefield information staff 's primary role in the networked environment is gaining and maintaining information superiority. The battle staff officers primary responsibilities are to maintain the link between sensors and weapon systems, support the tactical infosphere, manage

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smaller staffs and highly mobile command posts at all levels of command."

[143]TRADOC Analysis Center, *Initial Insights Memorandum (IIM) for the Division Capstone Exercise Phase II (DCX II).* Ft Leavenworth: TRAC (2001) 25.

[144]INSS, *Dominant Battlespace Knowledge,* 101. This book states that the term "flatten" means that one or

battlespace information, and degrade the adversary's battlespace awareness. The C2V has three positions for the sensor, the info-structure, and the information warfare battle staff officer. The commander's tactical infosphere and commander-centric operations eliminates the need for detailed planning and the MDMP. The network provides access to the battle staff functions in another echelon. The commander uses intuitive decision-making, adaptive mission orders, and command by negation while his small staff gains and maintains his tactical infosphere.

The Last model is the "networked Army" from the book *Information Technologies and the Future of Land Warfare*. The forward battle staff fights with the commander and the network connects him to staff resources. He networks and collaborates with knowledge workers that belong to other organizations and specialize in a particular function. These functions remain personnel, communication, logistics, and intelligence, however are not in the commander's organization. The commander's battle staff focuses on warfighting. The network provides the commander with all other staff functions.

Virtual staff organizations have unique advantages. First, it eliminates multiple command posts on the battlefield. It also allows the Army to keep its current staff model of personnel, operations, logistics, and intelligence. The commander and a small number of staff officers (four or five based on the C2V model) that C2 the fight from anywhere. Security requirements are less and it simplifies the commander's span of control. He is not concerned with the echelonment and moving of command posts. The virtual staff corrects the problem identified in DCX II of moving staff officers and command posts without losing tempo.

All these recommendations require the use of execution or commander-centric concepts and the use of personal judgment over an analytic staff-centric decision model. If Martin Van Creveld is correct, the battle staff will increase in size. As the complexity of modern warfare increases, the greater the quest for certainty, and the greater need for "control organs." He offers this piece of advice: "Instead of confining one's actions to what available technology can do, the

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more controlling headquarters from actor to decision maker can be eliminated.

point of the exercise is precisely to understand what it cannot do and then proceed to do it nevertheless."[145] John Keegan's advice is to remember that neither "machines or subordinates" can exercise the judgment for the commander.[146]

BIBLIOGRAPHY

Adams, Thomas K., "Future Warfare and the Decline of Human Decisionmaking," *Parmaters* (Winter 2001/02): 57-71.

Alberts, David S. and Czerwinski, Thomas J. ed. Complexity, Global Politics, and National Security. Washington D.C.: National Defense University, 1997.

Alberts, David, Gartska, David S., Hayes, Richard E., Signori, David A., *Understanding Information Warfare*: Washington D.C.: CCRP, 2001.

Alberts, David S., John Gartska, and Frederick P. Stein. *Network Centric Warfare: Developing and Leveraging Information Superiority. 2ed. Rev.* Washington: Center for Advanced Concepts and Technology, 1999.

Alberts, David S. and Gartska David S. *Information Superiority and Network Centric Warfare*, Information Warfare Society, 1999. Internet. Available at http://www.iwar.org.uk/iwar/resources/info-superiority1999. Accessed 15 February 2002.

Asssociation of the United States Army, *The Land Warfare Papers*. *No. 20, Setting the Terms of Future Battle for Force XXI*, by Douglas A. Macgregor. Arlington: The Institute of Land Warfare, 1995.

Banner, Gregory T., "Decision Making – A Better Way," *Military Review* Vol 87 No 5 (Sep/Oct 97): 52-55.

Barnett, Thomas P.M., *The Seven Deadly Sins of Network-Centric Warfare*, U.S. Naval Institure, 1999. Internet. Available at www.nwc.navy.mil/dsd/7deadl~1.htm, accessed 22 January 2002.

Battle Command Battle Laboratory. *Battle Command Draft 2.1*. Ft Leavenworth: BCBL, 1994.

Blackwell, Paul E. and Bozek, Gregory E., "Leadership For the New Millenium" Military Review Vol. 78 Issue 3 (May/Jun 98): 40-50.

Bradford, Jeffrey A., "McArthur, Inchon, and the Art of Battle Command," Military Review Vol 81 Issue 2 (Mar/Apr 2001): 83-92.

[145]Van Creveld, *Command in War*, 274.
[146]Keegan, John. "Computers can't replace judgment," *Forbes*, 2 December 1986, 37.

Builder, Carl H., Bankes, Steven C., Nordin, Richard. *Command Concepts A Theory Derived from the Practice of Command and Control*, RAND, 1999. Internet. Available at http://www.rand.org/publications/MR/MR775/. Accessed 8 January 2002

Builder, Carl H. and Brian Nichiporuk. *Information Technologies and the Future of Land Warfare*. Santa Monica: Rand, 1995.

Caldwell, Jim "Technology Breakthrough Keeps Transformation on Track." Internet, http://www.fas.org/man/dod-101/sys/land/docs/man-la-fcs-000711.htm. accessed 5 September 2001.

Cebrowski, Arthur K. and Gartska, David S. *Network Centric Warfare: Its Origin and Future*, U. S. Naval Institute, 1998. Internet. Available at http://www.usni.org/ Proceedings/Articles98/PROcebrowski.htm.

Clausewitz, Carl von, *On War*. Translated by Michael Howard and Peter Paret. Princeton: Princeton University Press, 1984.

Combat Studies Institute, *Studies in Battle Command*. Ft Leavenworth: United States Army Command and General Staff College, 1994.

"Command Post of the Future" Internet, http://cacfs.army.mil/Exper_Projects/cpof.htm. accessed 1 September 2001.

Czerwinski, Thomas J. "Command and Control and the Crossroads" *Parameters* (Autumn 1996): 121-132.

Drucker, Peter F. *Management Challenges for the 21st Century*: New York: HarperCollins, 1999.

"Future Combat System" Internet, http://www.fas.org/man/dod-101/sys/land/fcs.htm. accessed 1 September 2001.

Garret, Stephen F., "Evolving Information-age Battle Staffs," *Military Review* Vol 78 issue 2 (Mar/Apr 98): 28-32.

Gheorghe, Boicu, Marcu, and Burke, *An Innovative Application from the DARPA Knowledge Development of a Course of Action Critiquer*, DARPA HKPKB and RFK Programs in Knowledge Base Development, 1999. Internet. Available at http://lalab.gmu.edu/publications/data/2001/COA-critiquer.pdf, accessed 10 January 2002.

Greer, James. "Collaborative Planning", School of Advanced Military Studies Class, 9 Oct 2001.

Harman, Larry D. and Cupp, Shawn O., "A Commanding Battle Staff," *Army Logistician* (Jan/Feb 1998): 32-36.

Harig, Paul T., "The Digital General: Reflections on Leadership in the Post-Information Age," *Parameters* (Fall 1996): 133-140.

Harris, Chesley. *Battle Staff Proficiency*. Ft Leavenworth, Center For Army Lessons Learned, 1995. CALL database on-line. Available at http:///calll.army.mil/products/ctc_bull/95-11.

Accessed 10 December 2001.

Headquarters TRADOC. *TRADOC PAM 525-70 Military Operations Battlefield Visualization Concept.* Fort Monroe: Headquarters TRADOC, 1995.

_____.*Draft TRADOC Pamphlet 525-3-91 Objective Force Maneuver Pamphlet* 525-3-91. Fort Monroe: Headquarters TRADOC, 2001.

_____.*Draft TRADOC Objective Force Unit of Employment Concept.* Fort Monroe: Headquarters TRADOC, 2001.

_____.*TRADOC PAM 525-5 Force XXI Operations*. Fort Monroe: Headquarters TRADOC, 1994.

_____.*TRADOC PAM 525-100-2 Leadership and Command on the Battlefield*. Fort Monroe: Headquarters TRADOC, 1993.

_____.*TRADOC PAM 525-100-1 Leadership and Command on the Battlefield*. Fort Monroe: Headquarters TRADOC, 1992.

Henry, Ryan and Peartree, Eward C., "Military Theory and Information Warfare," *Parameters* (Autumn 1998): 121-135.

Hittle, James D., *The Military Staff, Its History and Development*: Harrisburg: Stackpole Co, 1975.

Horvitz, Eric and Barry, Mathew, *Display Information for Time-Critical Decision Making, Decision Theory Group*, Microsoft Research, 1995. Internet. Available at http://ftp.research.microsoft.com/pub/ejh/vista.pdf, accessed 10 January 2002.

"How to Fight Force XXI" Internet, http://www.jwf.fte.osd.mil/./qrl/MustReadFile/ XXIdecisive.htm. Accessed 5 September 2001.

Institute for National Strategic Studies. *Dominant Battlespace Knowledge*: The Winning Edge. Washington D.C.: National Defense University Press, 1995.

Joint Chiefs of Staff. *JP 1-02 Department of the Defense Dictionary of Military and Associated Terms*, Washington D.C.: Joint Chiefs of Staff, 2000.

Keegan, John. "Computers can't replace judgement." *Forbes*, 2 December 1986, 36-38.

Klein, Gary. *Sources of Power*. Cambridge: The MIT Press, 1999.

LaChance, Michael A. "The Digital Planning Process: Lessons Learned From the AWES" *Military Intelligence Professional Bulletin* 24 (Apr-Jun 98): 9-13.

Marsh, Howard S. *Beyond Situation Awareness: The Battlespace of the Future (Draft)*: Office of Naval Research, 2000. Internet. Available at http://www.onr.navy.mil/ sci_tech/information/docs/beyond_sav.2.pdf. Accessed 21 December 2001.

McCaffrey, Barry. "Lessons of Desert Storm,"*Joint Force Quarterly* (Winter 2000-01): 12-17.

McClure, William B. Technology and Command: Implications for Military Operation in the Twenty-First Century. *Maxwell Air Force Base: Air University, Center for Strategy and Technology, July 2000.*

Miller, William J. LTC. Objective Force, Briefing to the School of Advanced Military Studies, briefing slides, 7 Sep 01.

National Research Council. Realizing The Potential of C4I: Fundamental Challenges. Washington D.C.: National Academy Press, 1999.

Noble, David and Mullen, Ronald. *Information Presentations for Distributed Decision Making*. Edited by Stuart E. Johnson and Alexander Levis. *Science of Command and Control.* Washington D.C.: AFCEA International Press, 1988.

Office of the Secretary of Defense, Battlefield Digitization: Office of the Secretary of Defense Department of Testing and Evaluation Report, 2000. Internet. Available at http://www.dote.osd.mil/reports/FY00/pdf/00digitization.pdf. Accessed 21 March 2002.

Olmstead, Joseph A. Battle Staff Integration. Alexandria: Institute For Defense Analysis, 1992.

Paparone, Christopher R. "US Army Decisionmaking: Past, Present and Future" *Military Review* Vol. 81 Issue 4 (Jul/Aug 01): 45-.

Roman, Gregory A. *The Command or Control Dilemma: When Technology and Organizational Orientation Collide*. Maxwell Air Force Base: Air University Press, February 1997.

Sauer, Gary G., "Battle Staff Integration: The Key to Battle-Tracking in Battalion Command Posts" Monograph, School of Advanced Military Studies, 1996.

Scales, Robert H., Jr. Future Warfare Anthology. Rev. Ed. Carlisle Barracks: U.S. Army War College, Strategic Studies Institute, 2001.

Schow, Greg, *Course of Action Analysis*, Directorate for Research and Engineering, US Army Stricom, 2001. Internet. Available at http://www.stricom.army.mil/STRICOM/E-DIR/ES/COAA/home.jsp.

Schorr, Steven B. "Battle Command Advance Warfighting Experiments." Monograph, TRADOC Analysis Center. 1994.

Spizer, John M. "FM 100-5 and Information Age Warfare" Military Review (Sep-Oct 97): 1-6.

Strategic Studies Institute, AY 97 Compendium Army After Next Project. Carlisle Barracks: U.S. Army War College, 1998.Taylor, Clarence. "U.S. Army Staffs Are They Broken? Monograph, School of Advanced Military Studies, 1992.

TRADOC Analysis Center, *Initial Insights Memorandum (IIM) for the Division Capstone Exercise Phase II (DCX II).* Ft Leavenworth: TRAC, 2001.

Turabian, Kate L. *A Manual for Writers of Term Papers, Theses, and Dissertations*. 6th ed. Chicago: University of Chicago Press, 1996.

Tzu, Sun, Art of War. Translated by Ralph D. Sawyer. Boulder: Westview Press, 1994.

U.S. Army. *FM 101-5 Staff Organization and Operations*. Washington DC: Department of the Army, 1997

_____.*FM 3-0 Operations*, Washington D.C.: Department of the Army, 2001.

_____.*FM 71-3 The Armored and Mechanized Infantry Brigade*, Washington DC: Department of the Army, 1996.

_____.*FM 71-100 Division Operations*, Washington D.C.: Department of the Army, 1996.

_____.*FM 5-0 Army Planning and Orders Production Initial Draft*, Washington D.C., Department of the Army, 2001.

_____.*FM 6-0 DRAG Command and Control*, Washington D.C., Department of the Army, 2001.

_____.TransformationWargame 2001, Carlisle Barracks: U.S. Army War College, 2001.

_____.*United States Army Transformation Campaign Plan*, Washington D.C.: Department of the Army, 2001.

_____.*United States Army White Paper Concepts for the Objective Force*, Washington D.C.: Department of the Army, 2000.

Van Creveld, Martin. *Command in War*. Cambridge: Harvard University Press, 1985.

Wass de Czege, Huba, *New Pardigm Tactics and Tactical Organizations: How to Think about designing and fighting the Future Combat System based tactical organizations*, SAMS Ft Leavenworth, 2001. Electronic version.

Wass de Czege, Huba and Jacob Biever. "Optimizing Future Battle Command Technologies." *Military Review* 78 (March-April 1998): 15-21.

Webster, William G., *Enhancing Battle Command With Tools of The 21st Century Functional Requirements of Force XXI Digitized Battle Command*, Center For Army Lessons Learned, 1995. Internet. Available at http://call.army.mil/products ctc_bull/95-11/ctc4.htm, accessed 5 November 2001.

Wilson, J. R. "U.S. Military Researchers Take Aim At Command Post of the Future" *Military & Aerospace Electronics* Vol 11 Issue 10 (Oct 2000): 1-3.